Danish Ministry
of Energy, Utilities
and Climate

DENMARK'S SEVENTH NATIONAL COMMUNICATION AND THIRD BIENNIAL REPORT

- UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CL MATE CHANGE

Denmark's Seventh National Communication on Climate Change

Under

the United Nations Framework Convention on Climate Change

and the Kyoto Protocol

and

Denmark's Third Biennial Report

Under

the United Nations Framework Convention on Climate Change

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Danish Ministry
of Energy, Utilities
and Climate

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Foreword

I am pleased to present Denmark's Seventh National Communication and Third Biennial Report under the United Nations Framework Convention on Climate Change.

Anthropogenic climate change is real, it is happening and must be taken seriously. However, so far progress in global efforts to combat climate change has been modest. Therefore the political rhetoric needs to be followed up by real action, if we are to reverse the current trend of increasing global greenhouse gas emissions.

The Danish government wants Denmark to contribute actively in meeting the calls from the scientists that significant reductions in greenhouse gas emissions are necessary. The Danish government's long-term target for 2050 is therefore to be a low emission society independent of fossil fuels.

Another example of our commitment was demonstrated in November 2017, when Denmark joined the Powering Past Coal Coalition together with other partners that are united in taking action to accelerate clean energy and climate protection through the rapid phase-out of traditional coal power. Therefore, Denmark is working to phase-out coal in the power production no later than by 2030.

Furthermore the Danish government has a national 2030 target of at least 50 percent renewables in the energy demand.With the current policies and measures the share of renewable energy is projected to be 40 percent in 2020.

The Danish government will, in 2018, present a strategy for reaching Denmark's non-ETS target under the EU Effort Sharing Regulation for 2021-2030 (ESR), which implements the national determined contribution of the non-ETS sectors in the EU under the Paris Agreement.

In 2018 the Danish government will also present a proposal for a new energy agreement for the period after 2020.

Finally, the Danish government will in 2018 present a climate plan that brings together the government's national and international climate initiatives.

Denmark welcomes the Paris Agreement, which is a milestone in global efforts to combat climate change. Denmark will fulfil its obligations mainly through the joint efforts of all EU Member States.

At the opening of the UN General Assembly in September 2017, the Danish Prime Minister and several other worldleaders initiated "P4G" - a Partnership for Green Growth and Global Goals to create a space for innovative public-private partnerships in water, waste, energy, food and land use, cities and circular economy to develop powerful solutions in support of the UN Sustainable Development Goals and the 2015 Paris Agreement on climate change.

The combined effect of the current national determined contributions submitted under the Paris Agreement are not sufficient to reach the target of the Paris Agreement. Therefore it will require further international cooperation to reverse global emissions as soon as possible in order to keep the increase in global temperature below 2 degrees Celsius. The need for further action will therefore continue to be a major global challenge.

The Danish government wants Denmark to showcase to the rest of the world that a green transition can be reconciled with economic growth. Experience from Denmark shows that it is possible to maintain high economic growth while at the same time reducing greenhouse gas emissions and dependency on fossil fuels through persistent and active energy policies focusing on enhanced energy efficiency and promotion of renewable energy.

Since 1990, the Danish economy has grown by about 50 percent, while energy consumption has remained more or less constant, the share of renewable energy has grown from 7 percent to 31 percent and the total greenhouse gas emission has been reduced by 31 percent. Denmark’s long history of energy and climate policies has increased the security of energy supply and contributed considerably to fulfilling Denmark’s climate goals.

Denmark is sharing these experiences and contributing to the global implementation of the Paris Agreement is Denmark’s bilateral cooperations. Through examples and solutions Denmark is assisting some of the world's largest greenhouse gas emitters in their transition to sustainable energy, while also advising on the necessary climate adaptation.

Copenhagen, December 2017

Lars Christian Lilleholt
Minister for Energy, Utilities and Climate

Introduction

At the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992, more than 150 countries signed the UN Framework Convention on Climate Change (the Climate Convention).

On 21 December 1993 the Climate Convention was ratified by a sufficient number of countries, including Denmark, for it to enter into force on 21 March 1994. Currently, there are 197 Parties (196 States and 1 regional economic integration organization) to the United Nations Framework Convention on Climate Change.

This report is Denmark's Seventh National Communication under the Climate Convention (NC7) and the fourth under the Kyoto Protocol as well as Denmark's Third Biennial Report under the Climate Convention (BR3). Since Denmark's ratification of the Climate Convention covers the entire Realm, the report also includes information on Greenland and the Faroe Islands. The Kyoto Protocol, however, only covers Denmark and Greenland due to a ratification with a territorial exclusion to the Faroe Islands. The second commitment period of the Kyoto Protocol only cover Denmark as part of the EU due to a planned ratification with a territorial exclusion to Greenland. The report is organised in accordance with the guidelines for national communications adopted by the parties to the Climate Convention and as far as possible it follows the Annotated Outline for the Fifth National Communication suggested by the Climate Secretariat in June 2009.

A summary of reporting of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol is given in Table 0.1. This table allows identifying the Kyoto Protocol elements that are allocated in different sections of the report.

TABLE 0.1 SUMMARY OF REPORTING OF THE SUPPLEMENTARY INFORMATION UNDER ARTICLE 7, PARAGRAPH 2, OF THE KYOTO PROTOCOL IN THE NC7.

Information reported under Article 7, paragraph 2	Chapter in NC7
National systems in accordance with Article 5, paragraph 1	3.3
National registries	3.4
Information on base year, assigned amount and total greenhouse gas emission trend under the Kyoto Protocol	3.5 and 3.6
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	5.3
Policies and measures in accordance with Article 2	4.3
Legislative arrangements and enforcement and administrative procedures	4.2
Information under Article 10: - Art 10a (programmes to improve the quality of local emission factors, activity data and/or models which reflect the socio-economic conditions of each Party for the preparation and periodic updating of national inventories) - Art 10b (measures to mitigate climate change and measures to facilitate adequate adaptation to climate change) - Art 10c (transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries) - Art 10d (maintenance and the development of systematic observation systems and development of data archives to reduce uncertainties related to the climate system etc.) - Art 10e (the development and implementation of education and training programmes)	Art. 10a: 3.3 Art. 10b: 4 and 6 Art. 10c: 7 Art. 10d: 8 Art. 10e: 9
Financial resources	7

In addition to efforts described in this report, Denmark also contributes to the European Union's common efforts under the Climate Convention and the Kyoto Protocol. Such efforts have – and will in the future – be transposed by implementation of common and coordinated policies and measures to reduce greenhouse gas emissions, including under the European Energy Union. Further information on the EU's climate policy etc. is available in the EU's Seventh National Communication submitted to the UNFCCC in December 2017.

In response to the recommendations from the review of Denmark's Sixth National Communication[1] estimates of the total effect of implemented and adopted policies and measures are included in Chapter 5.

The Danish Ministry of Energy, Utilities and Climate has been in charge of coordinating the work relating to Denmark's Seventh National Communication. Contributions have been made by the institutions mentioned in Box 0.1.

BOX 0.1 INSTITUTIONS CONTRIBUTING TO NC7 AND BR3

Danish Energy Agency, Danish Meteorological Institute and Geological Survey of Denmark and Greenland under the Danish Ministry of Energy, Utilities and Climate;
Danish Environmental Protection Agency, Danish Nature Agency, Danish AgriFish Agency and Danish Coastal Authority under the Ministry of Environment and Food of Denmark;
Faroe Islands - Environment Agency and Statistics Faroe Islands;
Greenland - Ministry of Nature and Environment, Ministry of Industry, Labour, Trade and Energy, Greenland Institute of Natural Ressources and University of Greenland;
Ministry of Education;
Ministry of Foreign Affairs;
(Ministry of Higher Education and Science;)
Ministry of Taxation;
Ministry of Transport, Building and Housing;
Roskilde University;
Statistics Denmark under the Ministry for Economic Affairs and the Interior;
Technical University of Denmark;
University of Copenhagen;
University of Southern Denmark;
Aalborg University;
Aarhus University and DCE - Danish Centre for Environment and Energy and DCA - Danish Centre For Food And Agriculture thereunder.

[1] http://unfccc.int/resource/docs/2014/idr/dnk06.pdf

1 EXECUTIVE SUMMARY

1 Executive Summary

1.1 National circumstances relevant to greenhouse gas emissions and removals

1.1.1 General

The Kingdom of Denmark – the Realm - comprises Denmark, Greenland and the Faroe Islands. The UN Framework Convention on Climate Changes has been ratified on behalf of all three parts of the Realm.

Today, Denmark has a population of 5.7 mill. and a total area of 43,000 km^2. More than 61% of the area is used for agricultural purposes, while 13% is forested and 14% is towns, roads and scattered housing, while the rest consists of natural areas, including lakes, watercourses, heath, etc.

The Danish climate is temperate with precipitation evenly distributed over the year. The mean annual temperature is 8.3ºC and mean annual precipitation is 746 mm.

Since 1993 economic growth in Denmark has been considerable, with GDP (Gross Domestic Product) rising at an average of approx. 1.6% per year until the global economic crisis from 2007. After the economy contracted in 2008-2009 positive growth rates has returned to an average of 1.6% annually in 2014-2016. In 2016, GDP amounted to DKK 2,065 billion, corresponding to DKK 360,000 per capita.

1.1.2 Energy, transport, the household sector and the business sector

Denmark is no longer self-sufficient in energy, due primarily to the decrease in production of oil and gas in the North Sea. Renewable energy is increasingly contributing to the energy supply.

Despite the economic growth, total energy consumption has remained largely unchanged at approximately 800 PJ since 1980. Denmark's dependence on oil and coal has fallen, and particularly within electricity and heat production, Denmark has succeeded in substituting with other fuels. In 2015, renewable energy accounted for about 30% of Denmark's observed energy consumption.

The observed energy consumption in 2015 was 720 PJ. In 2015, energy production and supply alone accounted for 27% of Denmark's total emissions of greenhouse gases.

The energy consumption in the household sector primarily comprises heating and electricity consumption. Since 2000 the net heat demand per m^2 has decreased and was in 2015 approx. 17.5% below the level in 1990. In the period 1990-2015 the economic development in total private consumption showed a 43.5% increase, whereas total household electricity consumption increased by 3.2% only.

Denmark is a relatively small and densely populated country with a large share of the population living in cities. This influence the transport activity in Denmark.

Industry's production value accounts for about 19.2% of total production. The largest sectors of industry are food and beverages, manufacturing of machinery and transport equipment, chemical and pharmaceutical industry and metal industries. By far the largest part of the greenhouse gas emissions in the business sector, is CO_2 from energy consumption, which in 2015 accounted for about 11% of Denmark's observed emissions of CO_2 related to energy consumption. The sector is also a source of emissions of industrial greenhouse gases, which in 2015 accounted for 1.5% of Denmark’s total greenhouse gas emissions.

1.1.3 Waste, agriculture and forestry

The waste sector's methane emissions account for 2.0% of the total greenhouse gas emissions in 2015. Methane emissions from the waste sector are expected to fall in the future due to the obligation the municipalities have had since 1997 to send combustible waste for incineration. In addition, gas from a number of landfill sites is used in energy production, which helps to reduce both CO_2 and methane emissions.

Over the last 56 years, the agricultural area in Denmark has fallen from 72% of the total area in 1960 to 61% in 2016. The number of farms has fallen by 69% from 1980 to 2015, while the average size of farms has increased by 200% in the same period, from 24 ha to 72 ha. At approximately 10%, agricultural exports still account for a considerable proportion of all Danish export. Emissions of methan and nitrous oxide from agriculture (i.e. excluding emissions from energy consumption) accounted for approximately 21% of Denmark's total emissions of greenhouse gases in 2015.

Approximately 15% of Denmark is forested, and the Forestry Act protects a very large part of the existing forest from other land use. The ambition is to have about 25% of Denmark's area forested by the end of the 21st century.

1.1.4 Greenland and the Faroe Islands

Greenland is the world's largest island, with an area of 2.2 mill. km^2, 85% of which is covered by the ice sheet. From north to south, Greenland extends over 2,600 km. Greenland has a population of around 55,900, and fishing is the main occupation.

Greenland's climate is Arctic. The warmest recorded temperature since 1958 is 25.5ºC, while temperatures can go down below -70ºC on the inland ice sheet.

The Faroe Islands consist of 18 islands with a total area of 1,399 km^2 and have a population of around 49,900. The climate is characterised by mild winters and cool summers and the weather is often moist and rainy. The mean annual temperature is 6.8ºC in Tórshavn.

Fishery and related industries are of such importance that their influence determines the overall performance of the Faroese economy. The Faroese economy is very sensitive to the international market for fish. Consequently, export income can fluctuate significantly from one year to the next, and these fluctuations spread quickly throughout the economy. The national accounts to 2015 indicate that a proportionally larger output value now comes from production of private and public services. The proportional output value from fishery and manufacturing fish products has declined correspondingly.

1.2 GREENHOUSE GAS INVENTORY INFORMATION

Denmark's greenhouse gas inventories are prepared in accordance with the guidelines from the Intergovernmental Panel on Climate Change (IPCC) and are based on the methods developed under the European CORINAIR programme.

Table 1.1 shows Denmark's, Greenland's and Faroe Islands' total emissions of the greenhouse gases CO_2, CH_4 and N_2O and the industrial gases HFCs, PFCs and SF_6 from 1990 to 2015, calculated in CO_2 equivalents in accordance with the general rules for inventories under the Climate Convention.

Table 1.2 shows Denmark's total emissions of the greenhouse gases CO_2, CH_4 and N_2O and the industrial gases HFCs, PFCs and SF_6 from 1990 to 2015, calculated in CO_2 equivalents.

TABLE 1.1 DENMARK'S, GREENLAND'S AND THE FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES, 1990 – 2015

Source: *Nielsen et al. (2017a).*

GREENHOUSE GAS EMISSIONS	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
	CO_2 equivalent (kt)					
CO_2 emissions without LULUCF	54,883	62,688	55,629	52,,940	50,689	36,449
CO_2 emissions with LULUCF	59,739	66,825	59,775	58,111	49,814	40,509
CH_4 emissions without LULUCF	7,663	8,090	7,946	7,709	7,384	6,884
CH_4 emissions with LULUCF	7,682	8,117	7,981	7,752	7,435	6,944
N_2O emissions without LULUCF	7,904	7,155	6,949	5,496	5,161	5,202
N_2O emissions with LULUCF	7,931	7,182	6,976	5,523	5,188	5,236
HFCs	NO,NE	241	711	952	972	677
PFCs	NO,NA	1	23	19	19	5
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO
SF_6	42	103	56	20	36	103
NF_3	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	70,493	78,279	71,313	67,136	64,261	49,321
Total (with LULUCF)	75,395	82,469	75,521	72,377	63,465	53,475
Total (without LULUCF, with indirect)	**71,710**	**79,416**	**72,187**	**67,871**	**64,817**	**49,734**
Total (with LULUCF, with indirect)	76,612	83,607	76,395	73,112	64,021	53,888
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
	CO_2 equivalent (kt)					
1. Energy	53,700	61,667	54,878	52,208	50,635	35,784
2. Industrial processes and product use	2,344	2,879	3,639	2,809	2,057	2,035
3. Agriculture	12,668	12,116	11,265	10,826	10,363	10,335
4. Land use, land-use change and forestry	4,902	4,190	4,208	5,241	-796	4,154
5. Waste	1,781	1,616	1,531	1,293	1,206	1,167
6. Other	NO	NO	NO	NO	NO	NO
Total (including LULUCF)	75,395	82,469	75,521	72,377	63,465	53,475

Note: NO: Not Occuring, NE: Not Estimated (partly), NA: Not Applicable (partly)

1.2.1 Carbon dioxide, CO_2

Most CO_2 emissions come from combustion of coal, oil and natural gas in energy industries, residential properties and in manufacturing industry (44% in 2015). Road transport is also a major contributor - about 34% in 2015. The relatively large fluctuations in the emissions from year to year are due to trade in electricity with other countries - primarily the Nordic countries.

In 2015, total actual CO_2 emissions inventoried under the Climate Convention, excluding land-use, land-use change and forestry (LULUCF), were about 34% lower than in 1990. If LULUCF is included, net emissions were about 32% lower.

The reduction since 1990 is due, in particular, to a significant change in the use of fuels in energy production from coal to natural gas and renewable energy, more widespread use of CHP and improved energy efficiency.

1.2.2 Methane, CH_4

Anthropogenic methane emissions primarily stems from agriculture, landfills and the energy sector, among which agriculture contributes the most by far. The emissions from agriculture are due to enteric fermentation in farm animals and the handling of manure.

Emissions of methane from landfills are decreasing, because the production of methane has fallen year by year since the ban on landfilling of combustible waste in 1997.

The emissions from energy production have been rising with increasing use of gas engines. However legislation establishing emission limits for existing gas-driven engines and decreased use of gas engines has resulted in lower emissions.

In 2015, total methane emissions were 10% below the 1990 level.

1.2.3 Nitrous oxide, N_2O

Agriculture constitutes the largest source by far of nitrous oxide emissions since it can be formed in the ground, where bacteria convert nitrous compounds from fertiliser and manure. Bacterial conversion of nitrogen also occurs in drain water and coastal water due to leaching and run off. From 1990, nitrous oxide emissions from agriculture have decreased by 28 % due to legislation to improve the utilisation of nitrogen in manure. A small share of nitrous oxide emissions originates from power and district heating plants, and cars with catalytic converters.

In 2015, total nitrous oxide emissions were 34% below the 1990 level.

1.2.4 The industrial gases HFCs, PFCs and SF_6

The contribution of f-gases (HFCs, PFCs and SF_6), to Denmark's total emissions of greenhouse gases is relatively modest. However, the emissions of these gases increased significantly during the 1990s. HFCs, which are primarily used in refrigeration and air conditioning, are the biggest contributor to f-gas emissions. From 1995 to 2015 annual emissions of HFCs increased from 241 to 677 Gg of CO_2 equivalents.

The total emissions of HFCs, PFCs and SF_6 increased by 128% from 1995 to 2015.

1.2.5 Total Danish emissions and removals of greenhouse gases

In 2015 the total Danish emissions (i.e. without Greenland and the Faroe Islands) were estimated to 47.9 million tonnes of CO_2 equivalents, Of the total Danish greenhouse gas emissions in 2015, CO_2 made up 73.3%, methane 14.3%, nitrous oxide 10.8%, and f-gasses 1.5%. If net contributions of CO_2 emissions by sources and removals by sinks from forests and soil are included (i.e. with LULUCF), then net total Danish greenhouse gas emissions corresponded to 52.1 million tonnes of CO_2 equivalents in 2015.

TABLE 1.2 DANISH GREENHOUSE GAS EMISSIONS AND REMOVALS BY GAS AND SOURCE AND SINK CATEGORIES IN 1990 - 2015

Source: *Nielsen et al. (2017a).*

GREENHOUSE GAS EMISSIONS	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
	CO_2 equivalent (kt)					
CO_2 emissions without LULUCF	53,591	61,615	54,296	51,522	49,170	35,147
CO_2 emissions with LULUCF	58,447	65,751	58,442	56,691	48,295	39,205
CH_4 emissions without LULUCF	7,624	8,051	7,907	7,671	7,347	6,849
CH_4 emissions with LULUCF	7,643	8,078	7,943	7,715	7,399	6,909
N_2O emissions without LULUCF	7,882	7,134	6,926	5,472	5,139	5,182
N_2O emissions with LULUCF	7,909	7,161	6,953	5,499	5,166	5,216
HFCs	NO,NA	241	704	933	950	634
PFCs	NO,NA	1	23	19	19	5
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO
SF_6	42	102	56	20	36	103
NF_3	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	69,139	77,145	69,912	65,636	62,661	47,919
Total (with LULUCF)	74,042	81,334	74,120	70,876	61,864	52,072
Total (without LULUCF, with indirect)	70,356	78,282	70,786	66,371	63,217	48,331
Total (with LULUCF, with indirect)	75,259	82,472	74,994	71,611	62,420	52,484
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
	CO_2 equivalent (kt)					
1. Energy	52,402	60,589	53,540	50,784	49,111	34,476
2. Industrial processes and product use	2,343	2,878	3,631	2,789	2,034	1,992
3. Agriculture	12,631	12,079	11,228	10,788	10,326	10,299
4. Land use, land-use change and forestry	4,902	4,190	4,208	5,240	-797	4,153
5. Waste	1,763	1,598	1,513	1,276	1,190	1,153
6. Other	NO	NO	NO	NO	NO	NO
Total (including LULUCF)	74,042	81,334	74,120	70,876	61,864	52,072

Note: NO: Not Occuring, NE: Not Estimated (partly), NA: Not Applicable (partly)

1.2.6 Greenland's emissions and removals of greenhouse gases

In 2015, Greenland's total emission of greenhouse gases excluding LULUCF was 557.41 kt CO_2 equivalent, and 558.46 kt CO_2 equivalent including LULUCF.

Stationary combustion plants (75.1 %) and transport (18.9 %) represent the largest categories. The net CO_2 emission from forestry etc. was 0.2 % of the total emission in CO_2 equivalents in 2015. Total GHG emissions in CO_2 equivalents excluding LULUCF have decreased by 14.6 % from 1990 to 2015 and decreased 14.4% including LULUCF.

1.2.7 The Faroe Islands' emissions and removals of greenhouse gases

In 2015, the Faroe Islands' total emission of greenhouse gases LULUCF was 868 kt CO_2 equivalent.

The main part - i.e. 93 % - of the emissions were from the fuel consumption including waste incineration in the energy sector in 2015. Almost 4 % were from Industrial processes and Product Use and a just above 3 % from Agriculture. The fluctuations in the GHG emissions in the Energy sector are decisive for the fluctuations in the total GHG emissions. The emissions from the Agriculture sector and from Industrial processes and Product Use are relative small and constant. In 2015, the total emissions were 20 % above 1990, the base year.

1.2.8 The national system for the estimation of greenhouse gas emissions

In pursuance of Article 5, Section 1 of the Kyoto Protocol, the Parties to the Protocol shall establish national systems for the estimation of greenhouse gas emissions.

The Danish Centre for Environment and Energy (DCE) is responsible for producing the Danish greenhouse gas emission inventories and the annual reporting to the UNFCCC and the DCE has been designated the single national entity under the Kyoto Protocol. DCE is therefore the contact point for Denmark's national system for greenhouse gas inventories under the Kyoto Protocol.

The work on the annual inventories is carried out in cooperation with other Danish ministries, research institutes, organisations and private enterprises.

The Danish emissions inventory is based on the 2006 IPCC guidelines for calculation of greenhouse gas emissions and the European CORINAIR program for calculation of national emissions. Generally, emissions are calculated by multiplying the activity data (e.g. fuel consumption, number of animals or vehicles) by an emission factor (e.g. the mass of material emitted per unit of energy, per animal or per vehicle).

Uncertainty in the greenhouse gas inventories is calculated as recommended in the IPCC guidelines and covers 100% of total Danish greenhouse gas (GHG) emissions. The result of the calculations shows that total GHG emissions were calculated to have an uncertainty of 5.4% and the uncertainty in the trend in GHG emissions since 1990 was calculated to be $\pm$ 2.0 %. The uncertainties are largest for N_2O emissions from stationary combustion and agricultural land and CH_4 emissions from enteric fermentation and solid waste disposal on land.

As part of the national system, DCE is drawing up a manual to use in quality assurance and quality control of the emission inventories.

DCE produces an annual report (National Inventory Report) for the Climate Convention in which the results of the calculations are presented and the background data, calculation methods, plan for quality assurance and control, uncertainty and recalculations are described and documented.

A number of improvements of the emission inventories have been made since Denmark's Sixth National Communication to the Climate Convention. In 2016, the responsibility for the official consideration and approval of the inventory has changed from the Danish Energy Agency to the Ministry of Energy, Utilities and Climate.

1.2.9 The National Registry for accounting of assigned amounts and credits from sinks and JI- and CDM-projects

Denmark's national allowances registry and other EU Member States national allowances registers are part of the EU emissions trading scheme, which entered into force on 1 January 2005. The 16th of October 2008 the EU ETS was included in the international emissions trading system under the Kyoto Protocol after successful connection to the International Transaction Log. As of June 2012 the EU ETS operations were centralized into a single European Union registry operated by the European Commission and as of December 2012 the Danish Business Authority has been responsible for administering the Danish KP Registry as well as Danish accounts in the consolidated EU ETS Registry.

Since Denmark's Sixth National Communication to the Climate Convention was published, only minor changes have occurred regarding the National Registry.

1.2.10 Trends in Danish greenhouse gas emissions from the base year under the Kyoto Protocol

The developments in Danish emissions and removals of greenhouse gases from the base year under the Kyoto Protocol to 2015 (the most recent inventory year), as they are to be inventoried under the Kyoto Protocol, are shown in Figure 1.1 together with a preliminary estimate for 2016.

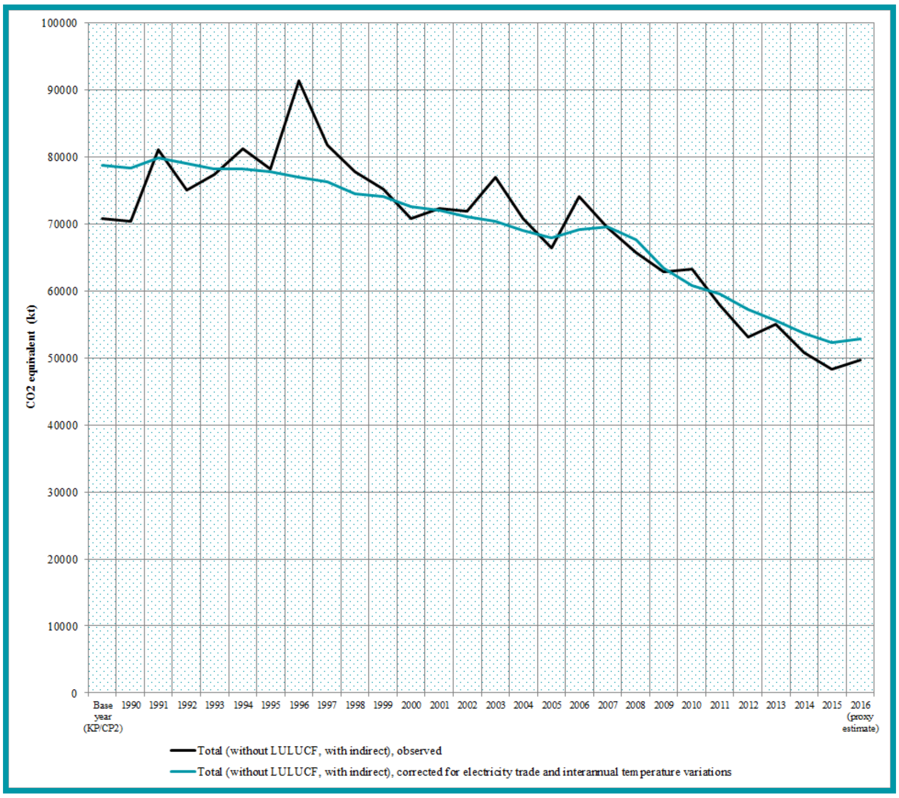
The relatively great variations in previous total emissions and removals of greenhouse gases are especially due to variations in Denmark's exchange of electricity with neighbouring countries. Furthermore, emissions of CO_2 from energy consumption vary considerably from year to year, depending on winter temperatures.

In order to facilitate the assessment of developments in CO_2 emissions associated with Denmark's own energy consumption in normal winters, estimates with corrections made for exchange of electricity and variations in temperature are also calculated in the annual energy statistics. The development in emissions with these correction is also shown in Figure 1.1.

As it can be seen from this Figure there has been a 34% decrease from the base year to 2015. The preliminary estimate for 2016 suggests an increase of 1 percentage point.

FIGURE 1.1: DENMARK'S GREENHOUSE GAS EMISSIONS AND REMOVALS 1990-2016 WITHOUT AND WITH CORRECTIONS FOR INTER-ANNUAL VARIATIONS IN TEMPERATURES AND EXCHANGE OF ELECTRICITY

Source: The UNFCCC's Report of the review of the initial report of Denmark, 2017 (base year), Nielsen et al., 2017 (1990-2015), the 2016 preliminary estimate elaborated by DCE and based on the preliminary energy statistics for 2016 by the Danish Energy Agency and with corrections of CO_2 emissions for degree days and net electricity imports and the preliminary estimate for 2016 from the Danish Energy Agency.



1.3 POLICIES AND MEASURES

1.3.1 Denmarks climate policy

Since the Brundtland Commission's report, "Our Common Future", from 1987, Denmark's climate policy has developed in collaboration with the different sectors of society, and in line with international climate policy, and results from related scientific research.

Thus, since the end of the 1980s a considerable number of measures to reduce emissions of greenhouse gases have been implemented.

Some of the measures have been implemented with reduction of greenhouse gas emissions as the main objective, others were aimed at achieving environmental improvements for society in general, e.g. by introducing environmental taxes and involving the public in the debate and decisions concerning the environment.

Since 2001, focus has also been on efforts to reduce emissions and meet the near-term international greenhouse gas emission reduction targets – i.e. for 2008-2012 under the first commitment period of the Kyoto Protocol and the EU Burden Sharing and for 2013-2020 under the second commitment period of the Kyoto Protocol and the EU Effort Sharing Decision – with view to meet the government's long-term target for 2050: a low-emission society independent of fossil fuels to ensure that

Denmark complies with the EU's target of 80-95 per cent reduction of greenhouse gases by 2050.

In relation to the period 2013-2020, Denmark is committed to a reduction in non-ETS emissions rising to 20% by 2020 relative to 2005. Furthermore, Denmark is committed to reaching a 30% share of renewables in energy use by 2020.

In relation to the period 2021-2030, and as part of the EU's so-called Intended Nationally Determined Contribution under the Paris Agreement, Denmark is committed to a reduction in non-ETS emissions rising to 39% by 2030 relative to 2005. Furthermore, Denmark is committed to reaching a 50% share of renewables in energy use by 2030.

The current framework for Denmark's energy and climate policy is the Energy Agreement reached with a majority of parties in the Parliament in March 2012.

The 2012 Energy Agreement contains a wide range of ambitious initiatives, bringing Denmark a good step closer to the target by 2050.

The Agreement will lead to large investments up to 2020 in energy efficiency, renewable energy and the energy system. Results in 2020 include approximately 50% of electricity consumption supplied by wind power, and more than 35% of final energy consumption supplied from renewable energy sources.

The long-term goal for Danish energy policy is to be independent of fossil fuels by 2050.

Only by improving energy efficiency, electrifying Danish energy consumption, and expanding supply from renewables, will it be possible to phase out fossil fuels completely. The initiatives in Denmark's Energy Agreement for the period 2012–2020 cover these crucial areas.

Danish climate policy is based on two pillars – the European and the national. As a small country with an open economy, it is clear that the more Denmark can implement climate policy with common European solutions, the better the total effect of climate policy and the easier it will be to maintain Danish competitiveness in relation to trading partners in the EU.

The EU is also a crucial player in international climate negotiations. The implementation of the Paris Agreement requires an ambitious common EU approach for the period after 2020. In light of this, the Commission has put forward proposals for the concrete implementation of the ambitious climate and energy EU targets for the period after 2020. These proposals are now under consideration by the European Council or the European Parliament.

Denmark is ready to contribute to the EU's reduction target of at least 40 per cent by 2030 (compared with 1990 levels) by taking on an ambitious 2030 targets for reducing emissions outside the quota system. In October 2017 Denmark agreed to a reduction in non-ETS emissions in the period 2021-2030, rising to 39% by 2030 relative to 2005, when the flexible mechanisms of the Effort Sharing Regulation are taken into account. The final approval by the European Parliament is still pending. In 2018, the government will prepare a cost-effective strategy for meeting Denmark's reduction target in 2030.

1.3.2 Legislative arrangements and enforcement and administrative procedures

The legal basis for the division of powers into the legislative, executive, and judicial power is the Danish Constitution, Danmarks Riges Grundlov .

The Constitution includes the legal basis for how the Regent acts on behalf of the Realm in international affairs, and he cannot act without the consent of the Folketing in any way that increases or restricts the area of the Realm, or enter into obligations requiring cooperation of the Folketing or which in some other way are of great significance to the Realm. Neither can the Regent, without the consent of the Folketing, cancel an international agreement entered into with the consent of the Folketing.

1.3.3 Policies and measures and their effects

Allowance regulation

For many of the energy producers and a large part of the energy-intensive industry, the Danish implementation of the EU Directive establishing a scheme for greenhouse gas emission allowance trading within the Community form the framework for Danish efforts (EU ETS). The companies that are covered by the scheme, and whose activity thus is limited by a quota, can plan their climate action themselves. They can choose to reduce their own emissions when this is most appropriate, or they can buy allowances or credits from project-based emission reductions when this is considered most appropriate. The companies covered by the scheme will thus have the possibility of ongoing adjustment of their action so that it is always as effective as possible.

After phase 1 (2005-2007) and phase 2 (2008-2012) the EU ETS is now in phase 3 (2013-2020). The allowances for the installations in the EU ETS have been calculated for 2013-2020 in accordance with the EU benchmarking decision 2011/278/EU. The Danish National Implementation Measures (NIM) list was approved by the European Commission in January 2014. This gives certainty about the activites covered regarding these activities' effect on Denmark's greenhouse gas emissions and accounting under the Kyoto Protocol 2013-2020.

The Kyoto Protocol mechanisms

For the period 2008-2012, the flexible Kyoto Protocol mechanisms have been important elements in supplementing domestic reduction measures aimed at fulfilling the international climate commitment under the Kyoto Protocol and the subsequent EU Burden Sharing Agreement.

For the period 2013-2020, the government will not use the flexible Kyoto Protocol mechanisms for the achievement of Denmark's target under the EU Effort Sharing Decision, which is to be seen as Denmark's contribution to the EU joint target under the 2nd commitment period of the Kyoto Protocol.

Taxes and duties

The levels of taxes and duties are also having an effect on several greenhouse gas emitting activities across sectors. Denmark has special taxes on motor vehicles, energy products, alcohol, tobacco, and a number of other products. During the 1990s a number of new environmental taxes were introduced. These taxes were placed on consumer goods that caused pollution or were scarce (water, energy products such as such as oil, petrol, electricity, etc.) or on discharges of polluting substances (CO_2, HFCs, PFCs, SF_6, SO_2, and sewage). Taxes are imposed on mineral oil, tobacco, and alcohol in accordance with EU legislation.

The new cross-sectoral national green climate fund

In connection with the PSO Agreement of 2016 a majority of political parties in the Danish parliament decided to allocate funds to a new national green climate fund. The fund is targeted initiatives accross all sectors that promote the green transition in an appropriate manner, including in particular initiatives that can contribute to the to the achievement of Denmark's 2030 greenhouse gas emission reduction target in the non-ETS sector, etc. The total budget for the fund is DKK 375 million for the period 2017-2020 - with DKK 50 million in 2017, DKK 50 million in 2018, DKK 100 million in 2019 and DKK 175 million in 2020.

In June 2017, the 1st allocation of the budget was decided. From the budget for 2017, 2018 and partially 2019 a total of DKK 104-106 million has been allocated for the following new initiatives:

1.1 Establishment grants for electric heat pumps on non-ETS cogeneration plants,
1.2 Mapping and advisory efforts for decentralized CHP plants,
2. Recycling system for flammable refrigerants,
3. Reduced retention time for slurry in stables,
4. Climate-friendly road surface,
5. Demonstration project - bio refinery plant,
6. Measurement of nitrous oxide from wastewater, and
7. Heat pumps on subscription for the business sector.

The energy sector

Energy production and energy-consuming activities in the different sectors are the main contributors to the total emissions of CO_2 due to use of large quantities of coal, oil and natural gas. This is due to use of large quantities of coal, oil and natural gas. The energy sector is therefore pivotal in the efforts to reduce the emissions of CO_2.

The goal of the energy policy today is to create well-functioning energy markets within frameworks that secure cost-effective solutions, security of supply, environmental concerns and efficient use of energy.

The goal of the 1970s energy policy was to prevent supply crises using a multiple energy supply, which reduced dependency on oil. In the 1980s, the main focus was to protect against large and external increases in energy prices through increased focus on self-sufficiency, co-production and macroeconomic considerations. In the 1990s the goal was the development of a sustainable energy sector.

Energy-policy key considerations have thus been both multi-faceted and changing as the goals were met and new challenges appeared. Over a number of years, many initiatives have been taken that have yielded positive results for society. At the same time, CO_2 emissions have been reduced in a number of sectors.

First, this success is due to significant efforts in the transformation sector. Particularly in the production of electricity and heat there has been a substantial increase in co-production and substitution with other fuels. Thus, natural gas, waste and biomass are increasingly being used in small-scale and industrial CHP plants, natural gas and renewable energy is increasingly being used in large scale electricity production, and natural gas is increasingly being used for individual heating of buildings.

A vast range of measures have been applied over the years to achieve the various energy policy objectives mentioned above.

Taxes have been used for a number of years as measures which also lead to a reduction of the CO_2 emissions from the energy sector - partly with a view to a general reduction and partly to promote the use of fuels with lower CO_2 emissions, mainly biomass. This includes lower CO_2 emissions, e.g. natural gas and biomass. Such taxes are still being used.

Increased use of CHP and enlarging the areas receiving district heat have been main elements of the Danish strategy to promote efficient use of energy resources ever since the end of the 1970s.

Renewable energy sources have been promoted with economic measures, including the tax system and through production grants.

From 2005 energy producers and parts of the energy-intensive industry are covered by the EU's CO_2 allowance scheme. From 2008 the allowance scheme has become the most important measure in Denmark's fulfilment of its climate obligations under the Kyoto Protocol. The allowance scheme permits significant improvements to the cost-effectiveness of Denmark's climate policies and measures.

The business sector

In addition to the key instrument - allowance regulation - the ongoing initiatives to reduce the emissions from the business sector include promotion of energy savings and energy efficiency improvements, conversion of energy production to cleaner fuels and initiatives to reduce the emissions of industrial gases .

The transport sector

Efforts to turn the upward trend in emissions of greenhouse gases in the transport sector have so far failed, in part because it is extremely difficult to reduce the CO_2 emissions in this sector in Denmark without international initiatives.

A great number of additional initiatives aiming directly or indirectly at reducing CO_2 emissions have been implemented within various areas. The effects of these initiatives are hard to quantify and in themselves they are not considered to have contributed significantly to CO_2 reductions.

The transport sector's possibility, with national measures, of contributing to reduction of Denmark's CO_2 emissions shows that the cost-effectiveness of the measures depends entirely on the side effects. Transport in itself has a number of side-effects in addition to contributing to the greenhouse effect through higher CO_2 emissions, for example air pollution causing poor air quality or acidification, noise, accidents and congestion.

The measures in the transport sector comprises both EU initiatives and national initiatives or a mix.

One example is the use of biofuels. From 2012 all petrol and diesel for transport sold in Denmark must contain an average of 5.75% of biofuels, which must live up to the EU sustainability criteria.

Another example is that cars with high energy efficiencies, such as electric vehicles, are granted large reductions in the registration tax. Electric vehicles are furthermore granted deductions in the registration tax until 2020.

The household sector

With a view to reducing both direct and indirect CO_2 emissions from the domestic sector, a wide range of initiatives have been launched. The initiatives promote electricity savings, savings in energy consumption for space heating and fuel conversion (from electric heat and oil to district heat, natural gas and renewable energy).

The portefolio of initiatives in the household sector include energy taxes, CO_2 taxes , energy labelling of buildings, energy labelling of buildings when built, sold or rented, regular energy labelling of large buildings and public buildings, minimum energy requirements and energy labelling of appliances, information initiative towards private households and support for the substitution of individual oil-based furnaces.

In the Energy Agreement from March 2012 several new measures for the period until 2020 are also included. One of the key ambitions in the agreement is to further improve energy efficiency and energy savings.

Industrial processes

Process emission of CO_2 from cement production have since 2005 been subject to regulation under the EU ETS.

When the only nitric acid production facility in Denmark stopped in 2004, nitrous oxide emissions decreased with by approx. 0,9 mill. tonnes of CO_2 equivalents.

The regulation of emissions of the industrial greenhouse gases (HFCs, PFCs and SF_6) is 2-phased, consisting partly in a tax and partly in a statutory order on discontinuation of the use of the gases in new installations. The tax is imposed on the substances on importation because none of them is produced in Denmark.

In July 2002 a statutory order on regulation of the industrial greenhouse gases entered into force. It includes a general ban on use of the industrial greenhouse gases in a wide range of new installations/products from 1 January 2006, including, for example, domestic refrigerators and freezers, PUR foam, etc.

Agriculture, forestry and fisheries

Within the agricultural sector the following measures have reduced, or will reduce, emissions: ban on burning straw on fields, Action Plans for the Aquatic Environment I and II and the Action Plan for Sustainable Agriculture, Action Plan for the Aquatic Environment III, the Ammonia Action Plan, Action Plan for Joint Biogas Plants and subsequent follow-up programmes, Environmental Approval Act for Livestock Holdings, New Energy Policy Agreement - supporting biogas and the Agreement on Green Growth 2009: Reduction of the agricultural sector's emissions of greenhouse gasses by an anticipated 800,000 tonnes of CO_2 eq. annually as a consequence of the energy, nature and environment initiatives.

The Action Plans for the Aquatic Environment and the Action Plan for Sustainable Agriculture have, in particular, reduced the emissions of nitrous oxide, and most of the changes in emissions of nitrous oxide from the agriculture sector that have taken place since 1990 can be attributed to these action plans.

In 2015 the Green Growth Agreement from 2009/2010 was replaced by the Political Agreement on a Food and Agricultural Package (FAP) which ensures better production conditions for farming, while at the same time handling a number of the key environmental challenges.

The agreement includes a diverse package of measures designed to make a shift in the way environmental regulation in the agricultural sector is carried out, from a general regulation to a targeted approach. The fertilization standards for the agricultural sector was lifted to the level of economic optimum and a new targeted regulation based on specific environmental goals for the aquatic environment and ground water resources is introduced from 2019.

Biogas from digestion of manure and organic wastes carries a number of advantages when used to substitute fossil energy: reductions in emissions of greenhouse gases, better utilization of manure as fertiliser, recycling and use of organic wastes for energy and fertiliser purposes etc. In order to stimulate expansion of the biogas sector the subsidy on the sales price of electricity production based on biogas was adjusted by the Energy Policy Agreement of 22 March 2012. The Agreement resulted in an amendment to the Promotion of Renewable Energy Act of 27 December 2008.

In June 2017, 9,0 million DKK were allocated for developing solutions in existing biogas plants and associated suppliers of feedstock with a view to reduce the retention time of manure. This is expected to increase the production of biogas per unit input of manure while at the same time reducing emissions of methane. The expected effect of this initiative is not included in the GHG emission projection from March 2017.

The LULUCF sector

The emission of GHGs from the LULUCF sector (Land Use, Land Use Change and Forestry) includes primarily the emission of CO_2 from land use and small amounts of N_2O from disturbance of soils not included in the agricultural sector.

The LULUCF sector is subdivided into six major categories:

- Forest
- Cropland
- Grassland
- Wetlands
- Settlements
- Other Land

Forests and forestry are important due to CO_2 sequestration and emissions as a consequence of trees growing, respiring and decomposing. Danish forests contain a considerable store of CO_2 absorbed from the atmosphere. When new forests are established, new CO_2 stores are created. Afforestation is therefore a useful climate policy instrument.

The national forest programme includes evaluation of the possibilities offered by the Kyoto Protocol for economically viable CO_2 sequestration in forests. The political goal with the most direct influence on increased carbon sequestration is the declaration of intent from 1989 to double the forested area in Denmark within 100 years. Various measures have been taken towards achieving this goal. For instance, a government grant scheme has been establish that supports private afforestation on agricultural land and the state itself establishes new forests. In addition, some private individuals choose to establish forests on agricultural land without a government grant.

For the agricultural soils and land-uses measures such as ban on burning straw on fields and support for planting of windbreaks have reduced, or will reduce CO_2 emissions and enhance CO_2 sequestration.

The waste sector

The waste sector's contribution to reduction of greenhouse gas emissions consists mainly in: reducing landfilling of organic waste, utilising gas from discontinued/existing landfill sites and the waste as an energy source.

The Statutory Order on Waste was amended from 1 January 1997, to introduce a municipal obligation to assign combustible waste to incineration (corresponding to a ban on landfilling combustible waste). As a result of this, large quantities of combustible waste that used to go to landfill sites are now either recycled or used as fuel in Denmark's incineration plants.

In 2005, the Danish EPA supported initiation of a development project aiming at documenting the oxidation of methane in landfill biocovers. Based on the promising results of the latest large scale biocover-project combined with a low shadow price, approximately 180 mio. DKK has been allocated to a Subsidy programme for biocovers at landfill sites. The subsidy programme is expected to run from 2016 – 2019, and the estimated reduction in methane-emission in the year 2020 is 300,000 t CO_2-equivalents.

1.3.4 Policies and measures in accordance with Article 2, of the Kyoto Protocol

Denmark's climate efforts – a step on the way to sustainable development

In 2015, United Nation countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. The Danish government is in the process of formulating an action plan for Denmark's national and international up-follow-up on the UN 2030 agenda and the global Sustainable Development Goals.

Efforts for international air transport and shipping

Denmark recognises that the international aviation and maritime transport sectors are large and rapidly growing sources of greenhouse gas emissions and have to be dealt with at international level. Given the global nature of the two sectors Denmark believes that the international organisations for civil aviation and maritime transport – ICAO and IMO – should decide and implement appropriate global measures to control greenhouse gas emissions from international aviation and maritime transport with levels of keeping EU's 2 degrees Celsius objective within reach.

Denmark welcomes that ICAO in 2016 decided to implement the Carbon Offsetting and Reduction Scheme for International Aviation, CORSIA. CORSIA is a market based measure, and the aim of CORSIA is to achieve carbon neutral growth from 2020.

Denmark welcomes that the IMO in October 2016 adopted a roadmap for developing a Comprehensive IMO Strategy on Reduction of GHG Emissions from Ships, which sets out an initial strategy to be adopted in 2018. Denmark further contributes actively to the ongoing discussions on the possibility to introduce a phase 4 after phase 3 in the agreed Energy Efficiency Design Index (EEDI) requirement together with the possibility to shorten phase 2 in order to move phase 3 forward to enter into force in 2022.

Efforts to limit adverse effects in other countries

In connection with Denmark's contribution to international climate efforts, in accordance with the Kyoto Protocol Denmark will endeavour to implement policies and measures under article 3 of the Protocol in such a way that adverse effects in other countries are minimised.

1.3.5 Greenland

Greenland is faced by a series of challenges in energy supply and demand. Due to climatic and infrastructural conditions as well as future developments in the industry, Greenland's consumption of energy is not likely to decrease. But Greenland is also witnessing the effects of climate change in the Arctic.

Greenland has therefore initiated policies and a series of political measures for the energy areas, supporting the objectives of the Climate Convention and the first commitment period under the Kyoto Protocol on the reduction of emissions of greenhouse gasses.

1.3.6 Faroe Islands

The Climate Convention was ratified by the Realm, and therefore it also applies for the Faroe Islands. When ratifying the Kyoto Protocol the Danish government followed a request from the Faroese Government took a territorial reservation for the Faroe Islands.

In a move to follow international recommendations, the Faroese Government has decided that the Faroe Islands shall be part of the Paris Agreement.

1.4 Projections and the total effect of policies and measures

In March 2017, the latest baseline scenario with a projection of Denmark's future greenhouse gas emissions 2016-2030 was published followed by a full documentation report in English in November 2017 with additional projection estimates for 2031-3035.

The purpose of the baseline scenario – the so-called “with (existing) measures” projection or WEM-scenario - is to get an assessment of how energy consumption and emissions of greenhouse gases will evolve in the future if no new policies are introduced. This is often referred to as a "frozen policy" scenario or a ”business-as-usual” scenario. The actual development will continue to be influenced by new political initiatives, and the scenario is not considered as a long-term forecast, but rather as a calculation that, on the basis of some given assumptions, we can identify the challenges which future climate policy must address.

The baseline scenario is based on a number of general economic assumptions (the output of industries, private consumption, fuel prices etc.), a number of specific assumptions on technology (what are the costs of different types of plants, what is the efficiency etc.) and assumptions about how the energy market players will act with pure market conditions.

Scenarios of this nature will always be subject to many key and uncertain assumptions. A different development than the assumed may therefore move the result in both directions. The baseline scenario includes the effects of already adopted, but not necessarily implemented, measures.

As shown in Figure 1.1 total Danish greenhouse gas emissions have exhibited a downward trend since the mid-1990s. In 2015, total emissions had fallen by about 27% compared with 1990. Emissions from the energy sector - which include emissions from electricity and district heating production, energy consumption by households and industries, as well as oil and gas extraction and refineries - have traditionally played a significant role in the calculations, but have also exhibited the most significant decrease as a result of Danish conversion of the energy system. Since 1990, the transport sector's share of total emissions has grown steadily due to rising transport needs in the wake of economic development.

Progress towards the EU non-ETS target for 2013-2020

Under the 2009 EU climate and energy package, Denmark is committed to reducing emissions from non-ETS sectors by 20% by 2020 relative to the 2005 level, as well as to achieving a set of sub-targets up to 2020. These sub-targets become progressively stricter up to the end-target in 2020. Overachievement in one year can be carried forward and used for target achievement in the subsequent year.

Overachievement is expected for the period 2013-2018. In 2019 the sub-target will be more or less reached, and 2020 will see an underachievement of slightly less than 1 million tonnes CO_2-eq.

Progress towards Denmark’s preliminary non-ETS target for 2030 in the EU

The Danish government has in October 2017 agreed to a further reduction in non-ETS emissions in the period 2021-2030, rising to 39% by 2030 relative to 2005 under the draft EU Effort Sharing Regulation for which final approval is pending (the European Parliament and the European Council reached a provisional agreement on the effort sharing regulation on 21 December 2017).

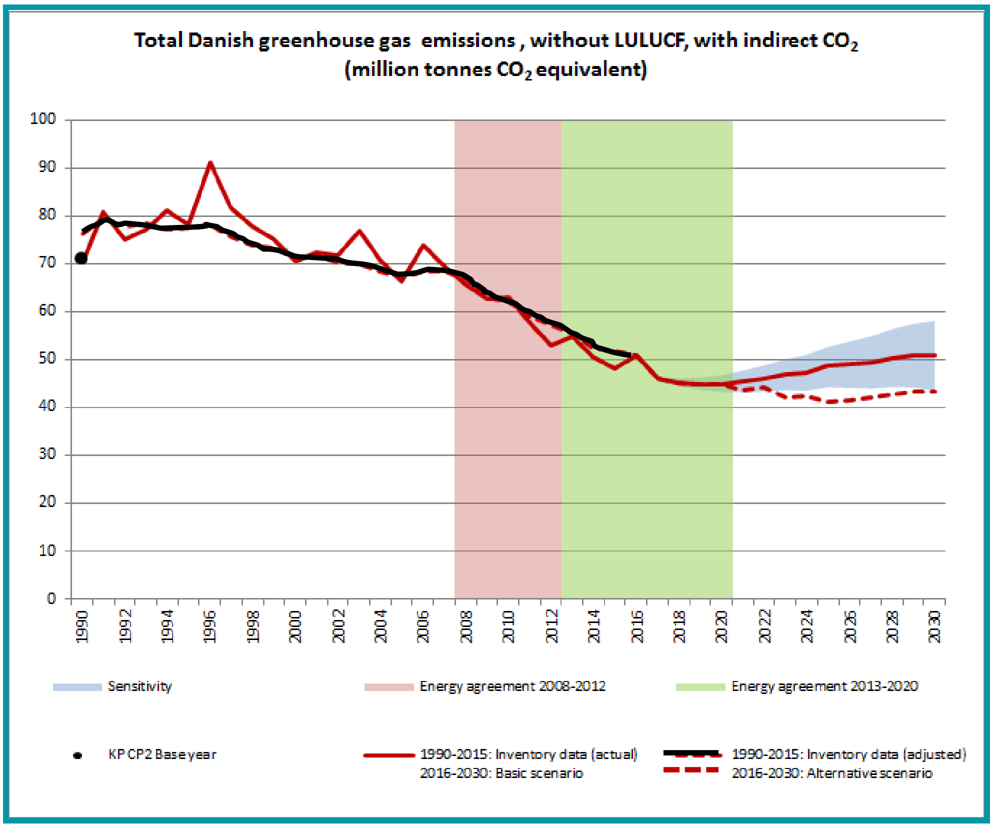
The Energy Agreement from March 2012 has brought Denmark a long way towards realising the 2020 target. However, significant additional efforts will be needed to reach the 2030 target.

Under an alternative scenario, which involves realisation of Ørsted's (the former DONG Energy) announced phase-out of coal by 2023, the rise in coal consumption will be considerably more modest and will not begin until the middle of the 2020s.

However, both without and with the Ørsted scenario additional efforts will be required to reach the reduction target for the period 2021-2030.

By 2030, Danish non-ETS emissions are likely to have been reduced by between 20% and 26% relative to the 2005 level, which is not enough to meet the target without additional reduction efforts or the use of possible flexible mechanisms. On the basis of these assumptions, it is anticipated there will be an overall need for accumulated additional reductions of between 21 to 38 million tonnes CO2-eq. (middle estimate of around 28 million tonnes) over the entire period 2021-2030, and between 5 and 8 million tonnes in 2030.

FIGURE 1.1 TOTAL DANISH GREENHOUSE GAS EMISSIONS, WITHOUT LULUCF, WITH INDIRECT CO2 IN THE BASIC SCENARIO (WEM) AND THE ALTERNATIVE SCENARIO UNTIL 2030, 1990-2015 ARE INVENTORY DATA WITHOUT AND WITH ADJUSTMENTS FOR INTERANNUAL VARIATIONS IN ELECTRICITY TRADE AND TEMPERATURE



1.5 VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES

The climate is changing, and in all likelihood we will see more changes in the future. In the long term, the future climate is strongly dependent on the future emissions of greenhouse gasses and other substances that influence the climate. The development in greenhouse gas emissions is especially dependent on three factors: demographic development, the rate and spread of implementation of energy-efficient technologies, particularly in the energy and transportation sectors, and the socio-economic development in general. The changing climate with rising temperatures, changing precipitation patterns, an increase in extreme weather events and rising sea levels will have a broad impact on ecosystems and society in general.

In relation to future global climate change, Denmark is a robust country. This is primarily because of a long tradition of legislation which prevents building in river valleys, along the coast and in forests. Agricultural land is well-drained and many farmers are able to irrigate in dry periods. Moreover, the Danish population is aware of, and uses, systematic warning systems of extreme weather events and the consequences of such events.

Adaptation measures in Denmark

In March 2008, the Danish government launched the first Danish strategy for adaptation to a changing climate.

The strategy was followed by an action plan for a climate-proof Denmark , which was launched in December 2012 . The action plan is based on the notion that a responsible climate policy must do more than just work towards limiting climate change in the long term. It must also ensure the action necessary right now to adapt our society to a climate that is already changing.

The action plan presented 64 new initiatives and gave at the same time an overview of initiatives already set in motion by the government to ensure that Denmark will become resilient to climate change.

All parts of society must contribute to climate change adaptation in Denmark. Climate change adaptation is first and foremost based on initiatives at local level and involves the local authorities, companies or individuals. The individual stakeholders know the local conditions best, and are consequently in the best position to make decisions on adaptation.

Central government itself has a responsibility as the owner of infrastructure, buildings and land. However, the principle role for central government is to establish an appropriate framework for local climate change adaptation by, for example, adapting laws and regulations, but also by ensuring coordination and providing information. A solid framework for the efforts must support the specific parties involved, so that they can address the challenge in a socio-economically appropriate manner at the right time.

From 2012-2014 the Minister for the Environment established a task force on climate change adaptation as a sounding board for the municipalities with regards to their preparation of municipal climate change adaptation plans. The objective of this task force was also to ensure up-to-date data and relevant knowledge on the Danish Portal for Climate Change Adaptation www.klimatilpasning.dk.

Monitoring and evaluation framework

In the period February to August 2016, a working group with representatives from the Ministry of Environment and Food of Denmark, the Ministry of Energy, Utilities and Climate and the Ministry of Business and Growth carried out an evaluation of municipal climate change adaptation efforts.

Every municipality in Denmark has prepared a climate change adaptation plan, which mapped the risk of flooding, specified priorities and gave an overview of the efforts. 22 municipalities also had to prepare a risk management plan pursuant to the Danish Flood Risk Act, that relates to the EU Floods Directive.

The evaluation reveals that incorporation of climate change adaptation in municipal development planning has served as a basis for coordination of climate change adaptation efforts with other spatial planning efforts, and that it has provided a picture of local flood risks throughout Denmark.

New governmental initiatives on coastal protection and erosion

In 2017, the Danish government decided to carry out a number of initiatives to support municipalities and property owners in establishing cost-effective and holistically planned flood and erosion protection. Several of the initiatives build on the work of a cross-ministerial committee set up at the beginning of 2017.

Adaptation measures in Greenland

The Government of Greenland is initiating projects aimed at mainstreaming adaptation efforts in the management and development of various sectors. A series of assessments of how the public sector can promote adaptation to climate change was launched in 2011. The first assessment focus on 'Opportunities for climate change adaptation in the fisheries and hunting industry' (September 2012). The assessement is conducted on the basis of existing scientific assesments and local knowledge. The assessment report draws up a range of conlusions pointing to the fact that climate change has both direct and indirect consequences, often resulting in significant and unpredictable impacts on the fishing and hunting sector.

Efforts and actions towards the adaptation to climate change should therefore be viewed as a continuous process to be dealt with in close cooperation with the public administration, the scientific community and the industry and various local stakeholders.

An integrated adaptation and mitigation assessment of the shipping sector was completed for political deliberation in 2015.

The latest assessment 'Opportunities for climate change adaptation in the agricultural sector' was completed for political deliberation in June 2017. The assessment describes the consequences of climate change towards 2050 for the agricultural sector with a focus on how climate change can affect livestock, grazz production, crops and watering.

1.6 FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

Since 2012, the Danish policy towards development assistance and climate finance has been guided by various frameworks, namely the overall strategy ‘A Right to Better Life’, supplemented by ‘A Greener World for all: Strategic Framework for Natural Resources, Energy and Climate’ (2013) and ‘the Green Growth Guidance Note‘ (2014).

In January 2017, the Danish Government presented its future strategy for development cooperation and humanitarian action, ‘The World 2030‘. This new strategy specifically targets support to five Sustainable Development Goals: Goal No. 5 (gender equality), Goal No. 7 (sustainable energy), Goal No. 13 (climate), Goal No. 16 (peace, justice, institutions) and Goal No. 17 (partnerships).

Public support to developing countries for climate actions should comply with the 'Danida Aid Management Guidelines' and 'the Danish Finance Act'.

The public Danish support to climate relevant action in developing countries is provided through dedicated mechanisms, such “Climate envelope”, and as integrated element of other development cooperation and financing instruments and programmes. A significant part of the Danish climate finance is channelled through various international and multilateral development institutions, such as the World Bank, African Development Bank or UNDP, either as core funding or through special climate windows and programmes of these institutions. Likewise, Denmark provides parts of its climate financing through the operating entities of the financial mechanisms of UNFCCC – the Global Environmental Facility and the Green Climate Fund.

Denmark seeks to support both adaptation and mitigation related action with a view to contribute to sustainable development. Danish support to adaptation related activities and programmes address underlying causes of vulnerability, and contribute to building resilience against crises, natural disasters and the impacts of climate change. The support also assists developing countries in their efforts to integrate adaptation and emission reduction considerations in their national planning and policy preparation and implementation, including as part of supporting their Nationally Determined Contributions.

Through both multilateral and bilateral assistance, Denmark supports increased access to sustainable energy in developing countries, improvement in energy efficiency and improved access to climate-friendly technologies.

Denmark is one of few developed countries that fulfil the UN goal of contributing a minimum of 0.7 percent of the gross national income to development assistance. About 30% of the total budget is channelled as core contributions to multilateral institutions, mainly the EU, the UN, the World Bank and the regional development banks that play important roles in the global climate finance landscape. Contributions to the core functions of the organisations are complemented by targeting thematic and regional initiatives, where Denmark has special interests, including to various climate relevant programmes and trust funds.

1.7 RESEARCH AND SYSTEMATIC OBSERVATIONS

Research and observations within climate in the broad sense of the word are going on at a number of institutes and organisations and cover a wide range of disciplines, from natural science to evaluation of policies and measures and societal aspects.

The Danish Meteorological Institute (DMI) carries out observations of climate parameters (atmosphere and ocean), including observations under the World Meteorological Organisation (WMO)'s programmes and sub-programmes. Climate observations, together with climate research, have been one of DMI's main tasks for more than 125 years, with measurement, theory and modelling. DMI has research competence in carrying out calculations of the climate in the future using global and regional climate models.

The National Environmental Research Institute (NERI) under Aarhus University (AU) is in charge of monitoring the effect of climate change on nature and environment.

Research competence concerning physical expressions of past climate change is particulary at the Geological Survey of Denmark and Greenland (GEUS), the University of Copenhagen (KU) and Aahus University. GEUS also has competencies in glaciological studies of Greenland's ice sheet and its interaction with climate change, and the importance of climate change for the hydrological cycle. The Geophysical Department and the Geological Institute at KU and the Geological Institute at Aarhus University have very great expertise in palaeoclimate data, and the climate group at KU is known worldwide for its ice core drilling and analyses. NERI contributes important research competence in relation to the effect of climate change on ecosystems.

Other institutions, e.g. Forest and Landscape Denmark (SL) under KU, the Danish Institute of Agricultural Sciences (DJF under AU), Risø National Laboratory under the the Technical University of Denmark (DTU), University of Southern Denmark, Roskilde University, Aalborg University and the Danish Coastal Authority work with different aspects of climate research.

It is partly on the basis of research competencies in the above-mentioned areas that Denmark participates actively in IPCC's work. In addition, the Danish climate research contributes to several international projects under the World Climate Research Programme.

DMI monitors the main weather and climate parameters regularly. In the climate monitoring programme, classic methods of measurement are used and new, satellite-based observation methods are developed. DMI operates around 200 automatic measuring stations in the Realm (Denmark, Greenland and the Faroe Islands) with a broad measuring programme ranging from automatic water level or precipitation stations that measure only one parameter to stations with a full measuring programme, including automatic cloud height detectors and weather type detectors. To collect precipitation data, DMI also operates a network of about 450 manual precipitation stations, which are used mainly for mapping the precipitation climatology. The measurements are collected on a daily basis via telephone and are thus available shortly after measurements have been made.

Besides being of use for national programmes, the observations concern Denmark's international contribution in the form of observation components from Danish territory to the worldwide meteorological observation network WWW (World Weather Watch), UNFCC and other international programmes for mapping weather and climate within the GCOS (Global Climate Observing System) coordinated by the World Meteorological Organization (WMO).

The meteorological observations are stored in DMI's database, and observations from many Danish stations are available in electronic form right back to 1872, water level measurements back to 1890, and measurements of the surface temperature of the sea back to 1931.

1.8 EDUCATION, TRAINING AND PUBLIC AWARENESS

Denmark has a long tradition for involving the public in the environment field. This tradition was followed up by an international agreement - the Aarhus Convention from 1998. On climate change, anthropogenic greenhouse gas emissions and political reactions in terms of policies and measures there is an ongoing public debate in the media and elsewhere.

Education and postgraduate education programmes

The education system in Denmark has a long-lasting tradition and practice in preparing and empowering students to live, learn, work and participate in a society with freedom and democracy. The overall management and democratic learning culture of schools combined with the framework curricula and learning objectives of all subjects provide the basis for pupils and students to develop necessary knowledge and skills to contribute to sustainable development, peace, human rights and global citizenship, in line with the Sustainable Development Goal for quality education for all, SDG 4.

Information on climate change and sustainable development in general for teachers involved in primary and lower secondary education is also available on several web-sites e.g. under the Ministry og Education. Sustainable development has also been a part of Danish upper secondary education for a number of years. The reform of upper secondary education, which was launched in august 2017, has a strengthened focus on sustainable development.

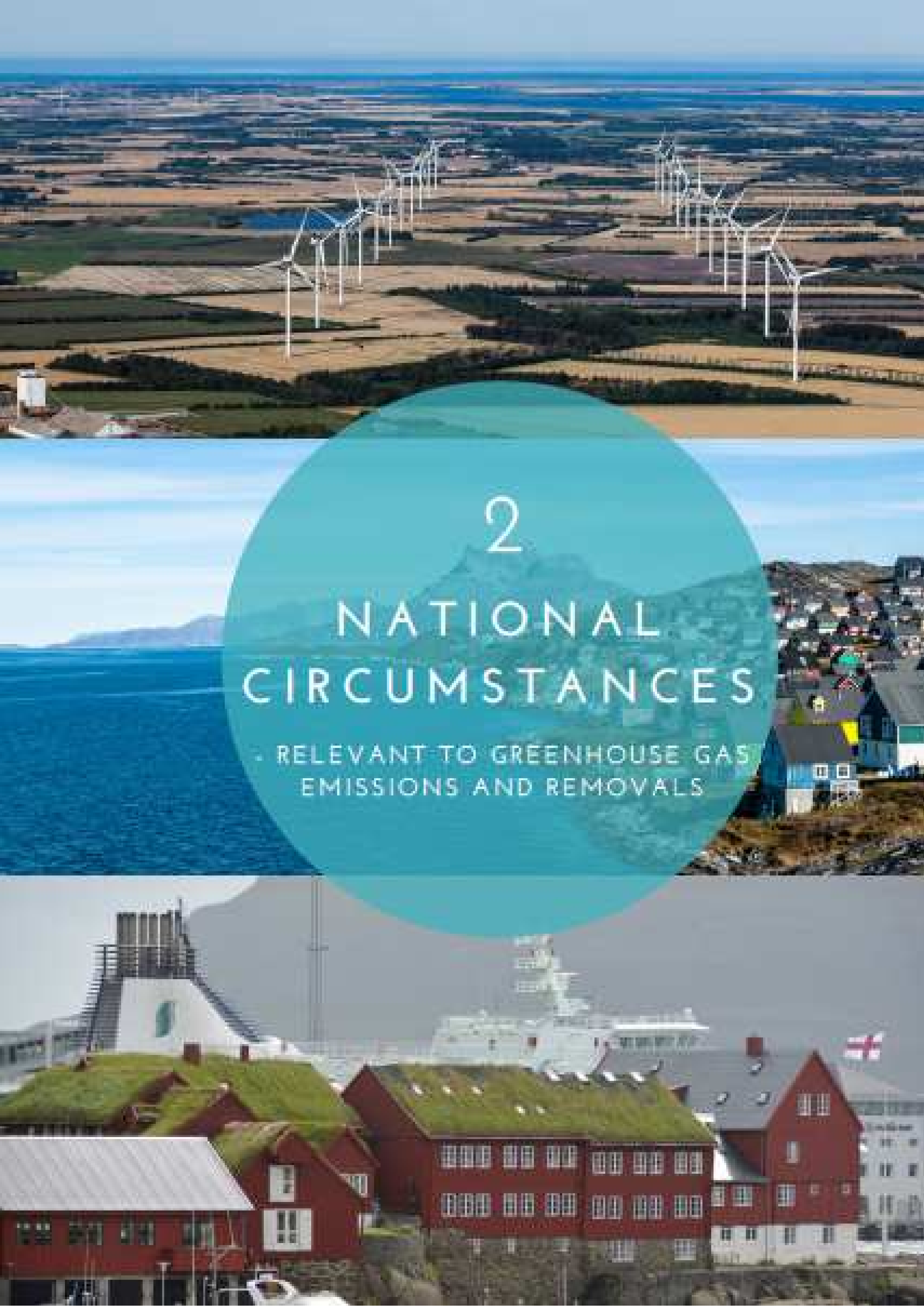
The universities in Denmark also offers education in climate as an integral part of many educational programmes – which are often offered with cooperation with other relevant institutions such as DMI, DCE, GEUS etc.

Climate information

A considerable amount of information on climate change and Danish policies is provided on the websites of Danish ministries, universities and institutions.

Danish participation in international climate activities

The Danish Meteorological Institute and Danish universities contribute to international climate assessments, notably the IPCC Assessment Reports and assessments by the Arctic Monitoring and Assessment Programme of the Arctic Council, such as the Adaptation Actions for a Changing Climate science report for the Baffin Bay/Davis Strait.



2 NATIONAL CIRCUMSTANCES

- RELEVANT TO GREENHOUSE GAS EMISSIONS AND REMOVALS

2 National circumstances
- relevant to greenhouse gas emissions and removals

The Kingdom of Denmark comprises Denmark, Greenland and the Faroe Islands. The UN Framework Convention on Climate Change has been ratified on behalf of all three parts of the Realm. Therefore, this report includes information about Denmark, Greenland and the Faroe Islands. However, at the present time, more information is available on Denmark than on the other parts of the Realm. Where tables, figures, and other information in this report also cover Greenland and/or the Faroe Islands, this is stated.

2.1 DENMARK

Denmark's national circumstances relevant to greenhouse gas emissions and removals are described in this Section. Among the most significant circumstances affecting greenhouse gas emissions and removals in Denmark are the following:

- Denmark is situated in a temperate climate zone. This implies a need for heating, especially during wintertime, and significant inter-annual variations in greenhouse gas emissions due to inter-annual variations in winter-temperatures.
- Denmark is an industrialised country with arable land and an economy based on manufacture of commodities, agricultural products and services for the global market. This implies a need for energy supply and electricity production.
- Denmark is a flat country. This implies insignificant access to hydro power in domestic electricity production and a long history of dependence on fossil fuels in the country's energy supply, especially coal and oil. Until 1980s this was almost solely based on imports, but in the period 1997-2012 Denmark was self-sufficient in energy due to production of oil and gas in the North Sea.
- Denmark has no nuclear power. Since 1990 Denmark has increasingly had a shift from coal and oil to natural gas and renewable energy sources, increased the use of combined heat and power production and decentralised power production, where the combined production is utilised for district heating. Together with improvements in energy efficiency, keeping energy demand almost constant despite a significant economic growth, and initiatives regarding the agricultural sector, waste, industrial greenhouse gases etc., Denmark's emissions of greenhouse gases related to domestic activities, including domestic electricity demand, have been decreasing.
- Denmark's electricity production capacity is an integral part of the Nordic electricity market, in which hydro power in Norway and Sweden is also an integral part. This implies significant inter-annual variations in Denmark's total greenhouse gas emissions, with elevated emission levels in years with low precipitation in Norway and Sweden and vice versa. In 1990, the base year under the United Nations Framework Convention on Climate Change and the Kyoto Protocol, Denmark's total greenhouse gas emissions were extremely low due to an extremely large electricity import from the Nordic countries, which experienced particularly high precipitation that year.

These highlighted national circumstances are not the only national circumstances relevant to Denmark's greenhouse gas emissions and removals. In the rest of this Section, further information on relevant national circumstances and indicators is given.

As briefly introduced above, policies and measures in Denmark also affect Denmark's greenhouse gas emissions and removals. Further information on policies and measures relevant to Denmark's greenhouse gas emissions and removals is included in Chapter 4.

2.1.1 Form of government and structure of administration

Denmark is a constitutional monarchy, and the power of the state is divided between the legislative branch, the executive branch, and the judicial branch. According to the Constitution of the Realm, legislative power lies with the Folketing, which consists of 179 members, two of whom are elected in the Faroe Islands and two in Greenland. The members are elected by the population for a period of normally four years. A new general election can mean that a member sits for less than this period.

The executive branch - the government - cannot have a majority of the Folketing against it, cf. the regulations in the Danish Constitution on votes of no confidence. Since 1953, Denmark has often had a minority government, i.e. a government supported by a minority of the members of the Folketing. In these situations the government will need to include a support party.

The number of ministers in the government varies. Since 1971 Denmark has had a Minister for the Environment and a Ministry of the Environment, which also had primary responsibility for Denmark's policy on climate change until 2007. In 2007 a Ministry of Climate and Energy (now: Ministry of Energy, Utilities and Climate) was established. The minister for Energy, Utilities and Climate has the primary responsibility for coordination and implementation of legislation, plans etc. relating to Denmark's climate policy and is representing Denmark in international negotiations on climate change issues.

For the last thirty years or more, other ministries have also worked with environmental and climate issues. In 1988 the government decided to follow up the UN report on sustainable development, the Brundtland report, in which one of the main messages was the necessity of integrating the environmental issue into the administration within sectors such as transport, agriculture, and energy.

For this reason, a number of sector ministries have drawn up action plans in which the environment is an integral element. Examples are sector plans for energy, transport, agriculture, and development assistance. In the climate area, an overall status report was presented in connection with the proposal for ratification of the Kyoto Protocol in April 2002. This status report was followed by a national Climate Strategy for Denmark for 2008-2012, which was adopted by the Folketing on 13 March 2003. In December 2008 Denmark and the other EU member states adopted the EU Climate and Energy Package. With this package Denmark's primary climate and energy objectives until 2020 was established.

One of the main cornerstones of Danish democracy is autonomous local government. Specific environmental action takes place not only at national level but also at municipal level. The state sets the national rules and framework for environmental administration, while the municipalities, working within this framework, plan and decide initiatives that implement and support the national legislation.

In 2007 the structure of the Danish public sector was reformed. With a view of merging smaller municipalities to have at least 20,000 (and preferably 30,000) citizens the number of Danish municipalities was reduced from 271 to 98. Along with the reform of the municipal structure, the Danish parliament reformed the regional structure in Denmark – closing down 14 counties and opening up five new regions. The reform led to several changes in the division of labour between the state, the (new) regions, and the municipalities.

The importance of local involvement is stressed in Agenda 21 - a global agenda for sustainable development in the 21st century, which was adopted at the Rio Conference in 1992. The government supports popular interest and participation in climate and environmental issues in different ways - including through implementation of the Pan-European Aarhus Convention and support for the local Agenda 21 work initiated by most of the Danish municipalities.

In the light of Denmark's role as host for the Fifteenth Conference of the Parties under the UNFCCC in December 2009, many additional initiatives to raise awareness and involve citizens, municipalities, the business community and other stakeholders have been taken – both at national and local level. Several municipalities have committed themselves to local targets for reducing greenhouse gas emissions (see http://www.dn.dk/Default.aspx?ID=4994 and http://www.kl.dk/Fagomrader/Teknik-og-miljo/Klima/).

2.1.2 Population

Today, Denmark has a population at around 5.7 mill. As can be seen from Table 2.1, population growth has been relatively small in the last 36 years.

TABLE 2.1 POPULATION OF DENMARK

Source: Statistics Denmark.

	1980	1990	2000	2010	2015	2016
Denmark's population (in mill.)	5.12	5.14	5.33	5.54	5.66	5.71

The latest forecasts show that population growth will continue to be moderate in the years ahead. For example, the population is expected to reach 5.8 mill. in 2020, rising to 6.4 mill. in 2050.

Today, the population density is 133 per km^2.

Today, 81% of Danish wage earners are employed in service sectors, while 18% are employed in manufacturing, construction and supply sectors and 1% in agriculture, forestry and fisheries.

2.1.3 Geography

Denmark consists of the Jutland peninsula and more than 400 islands. It has a total area of 43,098 km^2 and lies at about 55° N and 11° E.

The whole of the country is lowland. The surface was formed by Ice Age glaciers and glacial streams. The highest hill is approximately 170 metres above sea level.

The coastline has a length of more than 7,300 km. To protect low-lying land against flooding and storm surge, it has been necessary to build dikes or other permanent installations along about 1,800 km of coastline. In addition, sandbags, breakwaters and similar protect other parts of the coastline, which would otherwise erode because they consist of soft materials deposited during the last Ice Age.

A rise in the water level due to climate change would obviously affect the protection of the coasts and create a greater risk of flooding and erosion.

The Danish landscape is indelibly stamped by the high population density. More than 61% of the land is used for agriculture or horticulture. Woodlands take up approx. 13%, while towns, roads and scattered habitation take up 14%. The rest is nature or listed areas such as lakes, watercourses, heaths, dunes and beaches.

In relation to its size, Denmark is home to a wide variety of flora and fauna - in all, about 30,000 species.

2.1.4 Climate

The Danish climate is temperate with precipitation evenly distributed over the year. The country lies in the zone of prevailing westerly winds, which is characterised by fronts, low pressure, and changeable weather. Compared with other regions on the same latitude as Denmark, the climate is relatively warm due to the warm North Atlantic current that originates in the tropical sea off the east coast of the USA.

Denmark has a distinctly coastal climate, with mild, damp winters and cool, unsettled summers. Average temperatures vary from about one and a half degree in winter to about 15 and a half degrees in summer. However, the weather in Denmark is greatly affected by the proximity of both the sea and the continent. This means that the weather can change, depending on the prevailing wind direction. The westerly wind from the sea brings relatively uniform weather in summer and winter: mild in winter and cool in summer. When the wind comes from south or east, the weather in Denmark is more similar to that of the continent: warm and sunny in summer and cold in winter. The weather in Denmark thus depends very much on the wind direction and the season.

Atmospheric pressure

Average atmospheric pressure in Denmark shows seasonal variation, reaching a minimum in November and a maximum in May.

Denmark's highest-ever atmospheric pressure, 1062.2 hPa, was recorded in Skagen on 23 January 1907, while just one month later, on 20 February, the lowest atmospheric pressure in the history of Denmark was also recorded in Skagen, at 943.5 hPa.

Temperature

The annual mean temperature varies from year to year, from below 6ºC to 10ºC, with an average of 8.3ºC (1981-2010 level; 8.9ºC (2006-2015 level)). The coldest year so far was 1879, with a mean temperature of 5.9ºC, while the hottest recorded year was 2014, with 10.0ºC. The four years 2006, 2007, 2008 and 2014 are the warmest ever recorded in Denmark. 2008 and 2006 both had a mean temperature of 9.4°C, 2007 had a mean temperature of 9.5°C. This is followed by 1990 with 9.3°C. Since 1988, the majority of years has been hotter than average 1981-2010, and the temperature has shown a sharply rising trend from the 1990s. Since 1870, the temperature in Denmark has risen by about 1.5ºC, but the ten hottest years have occurred from the 1930s to present. The present temperature level is the highest in the time series and the period 2001-2010 was the warmest decade since records began. See Figures 2.1 and 2.2.

The temperature in January and February averages around 1ºC (1981-2010 level); around 1.3ºC (2006-2015 level) but can vary greatly from more than 15ºC to below -31ºC. The average temperature in July and August is around 16.5ºC (1981-2010); around 17ºC (2006-2015), but again can vary from -2ºC to more than 36ºC.

Precipitation

Average annual precipitation varies greatly from year to year and from place to place. The lowest annual precipitation for the country as a whole was 466 mm in 1947, and the highest was 905 mm in 1999, while the average annual precipitation is 746 mm (1981-2010 level); 792 mm (2006-2015 level).

The wettest period is normally June to January, while the driest is February to May.

In the winter months, precipitation is sometimes in the form of snow. Annual precipitation in Denmark has on average increased by about 100 mm since 1870. See Figures 2.1 and 2.3.

FIGURE 2.1 CLIMATOLOGICAL STANDARD NORMAL FOR DENMARK 1981-2010

Source: Cappelen 2017b

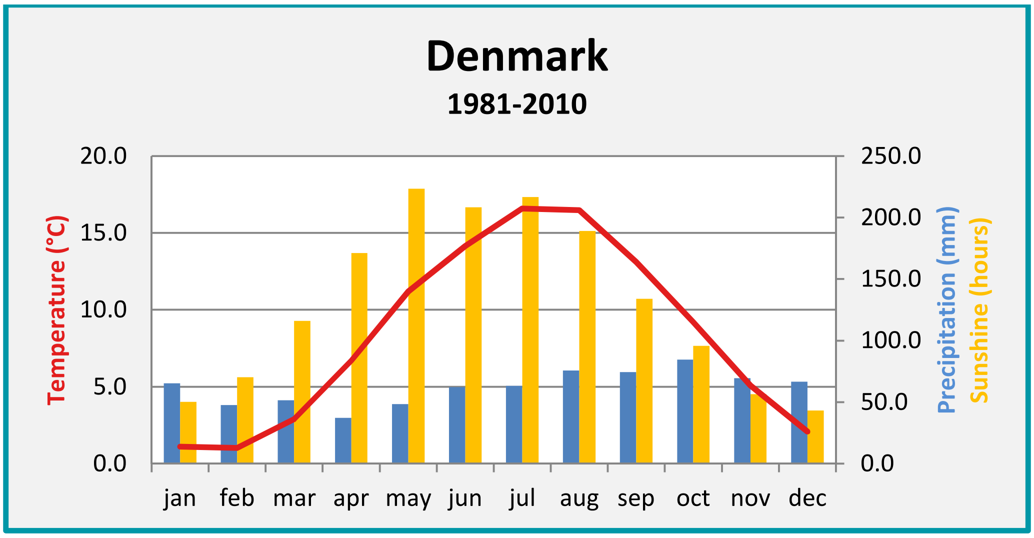


FIGURE 2.2 ANNUAL MEAN TEMPERATURE IN DENMARK 1873-2016 IN °C, ANOMALY RELATIVE TO 1981-2010

Source: Cappelen 2017b

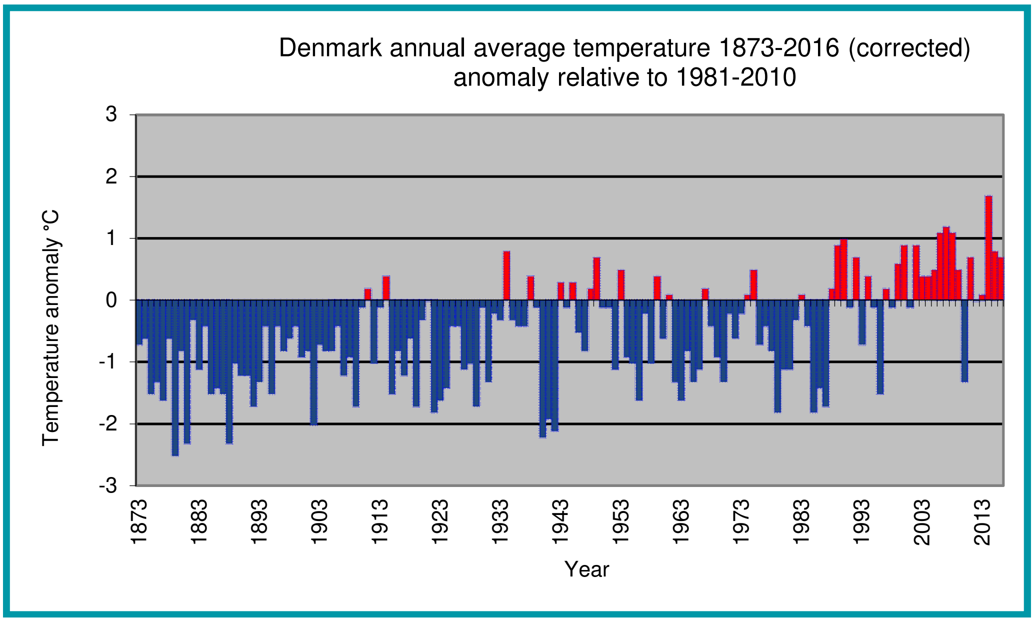
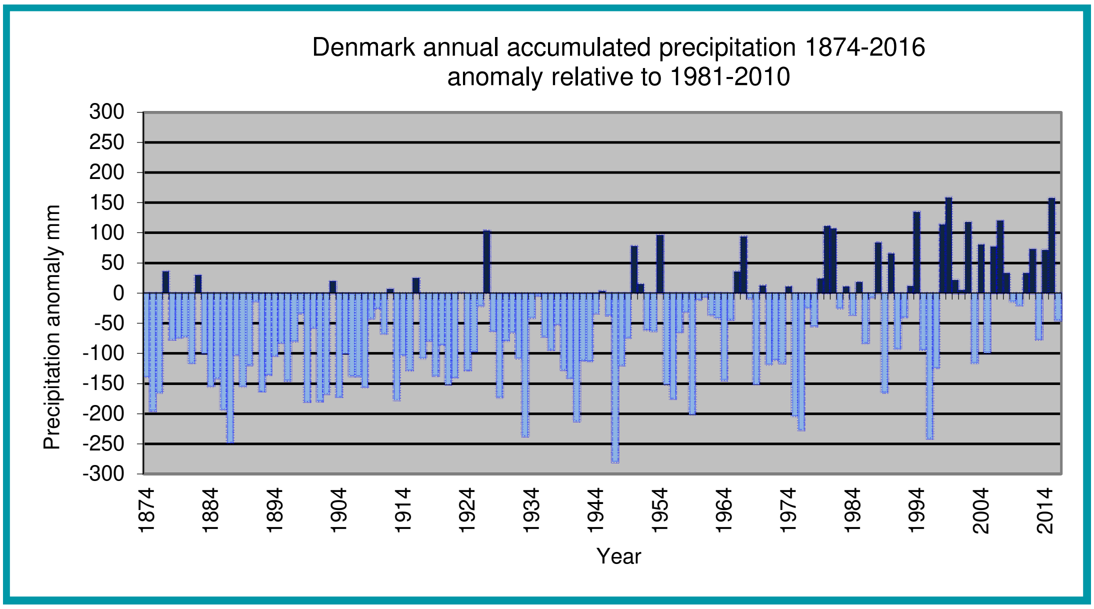


FIGURE 2.3 DANISH ANNUAL PRECIPITATION 1874-2016 IN MM, ANOMALY RELATIVE TO 1981-2010

Source: Cappelen 2017b



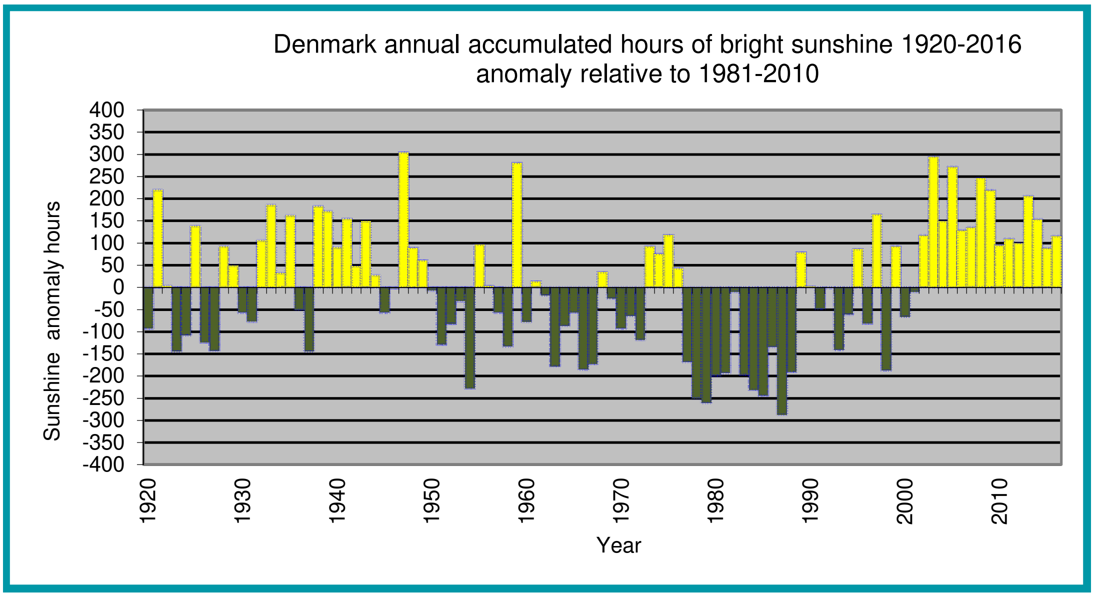
Hours of sunshine

On average, Denmark as a whole has about 1,574 hours of sunshine annually (1981-2010 level); 1,722 hours (2006-2015 level), but this figure varies greatly from year to year. The sunniest year was 1947, with 1,878 hours, and the least sunny was 1987, with 1,287 hours. There is least sunshine in January and December, with an average of about 47 hours (1981-2010 level); the same (2006-2015 level) , while May, June and July have the most sunshine, with an average of about 215 hours (1981-2019 level); about 240 hours (2006-2015 level).

Since 1980, the trend has been towards more hours of sunshine. See Figure 2.4.

FIGURE 2.4 ANNUAL HOURS OF SUNSHINE IN DENMARK 1920-2016, ANOMALY RELATIVE TO 1981-2010

Source: Cappelen 2017b



Wind

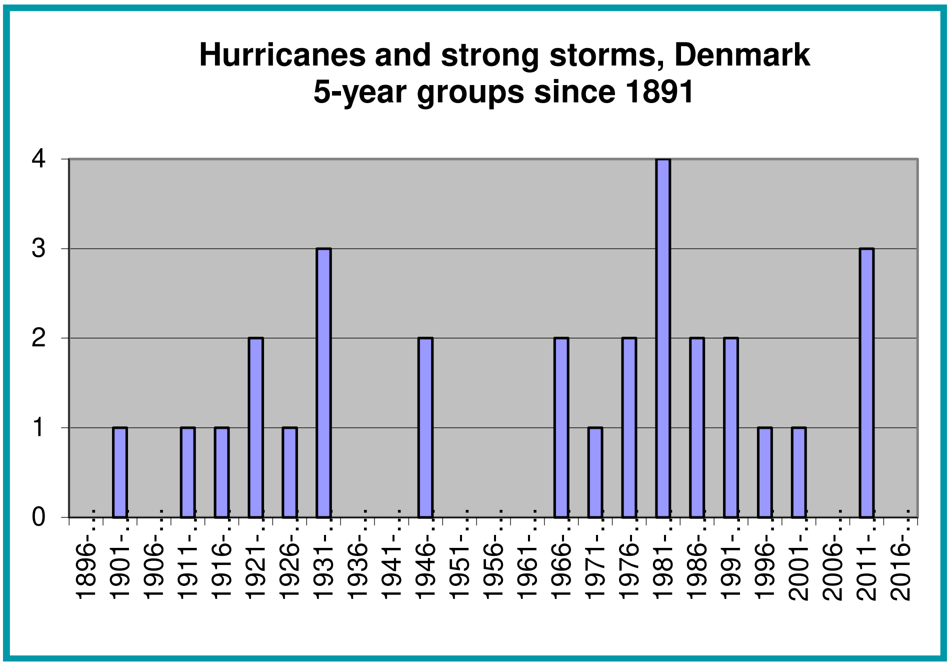
The annual mean wind velocity at three coastal locations, Skagen, Hvide Sande and Gedser are between 7.0 to 7.8 m/s (1989-1998 level), and the wind is most frequently from westerly directions, from which about 30-40% of all winds come.

The number of days with severe wind (≥ 10.8 m/s) varies from about 30 in some places inland to above 170 days at Skagen. On average, above storm-force (≥ 24.5 m/s) occurs along the Danish coasts every second to three years. A Danish list of storms has 52 cases with storm force and above in the periode 1891-2016. In December 1999 large parts of Denmark were hit by the worst-ever measured hurricane, and in some places in the North Sea at a oil rig mean wind velocities (average over 10 minutes) of more than 50 m/s (approx. 180 km/h) were recorded, with gusts of about 60 m/s (approx. 216 km/h). During the hurricane "Allan" on 28 October 2013 record-breaking 10 minutes mean winds; 39,5 m/s (approx. 142 km/h) and gusts; 53,5 m/s (approx. 193 km/h) were registered in a coastal area.

Since the mid 1800's and up until today, studies show no general change, only variations, in wind climate.

A windier climate was registered at the beginning and end of the 1900's, whereas the period from 1930 to early 1960's has been relatively less windy like the first decade of this millennium. In the last couple of years three hurricanes/strong storms, two in November/December 2013 and one in November 2015, seems to have changed this picture. See Figure 2.5.

FIGURE 2.5 DANISH HURRICANES AND HURRICANE-LIKE STORMS IN 5-YEAR GROUPS 1891-2016.
Source: Cappelen 2017b



2.1.5 Economy

From 1990 to 2016 the Danish economy grew at an average annual growth rate of 1.6% measured in GDP (fixed prices). In 2008 and 2009 the economy contracted by 0.5% and 4.9% respectively. From 2009 the economy showed positive growth rates again returning to an average of 1.6% annually in 2014-2016. In 2016, GDP (in current prices) was DKK 2,065 billion, corresponding to DKK 360 thousand per capita (1 Euro = approximately DKK 7.45).

Denmark has a very export and import intensive economy, and thus the country is sensitive to global economic trends. In addition, public expenditure accounts for a large part of final consumption, cf. Table 2.2.

TABLE 2.2 KEY FIGURES FOR THE DANISH ECONOMY. 2016, DKK BILLION, CURRENT PRICES

Source: Statistics Denmark (E2015).

Key parameters	2016 [Billion DKK]
GDP	2,065
Imports	963
Exports	1,102
Consumer spending	981
Public expenditure	526
Gross investment	420

The Danish economy is specialised in the tertiary sectors, as both primary and secondary sectors, i.e. agriculture and industry, account for less than 20 percent of total gross value added (GVA), cf. Table 2.3.

TABLE 2.3 THE BUSINESS SECTOR'S CONTRIBUTION TO GVA, 2016, DKK MILLION, CURRENT PRICES

Source: Statistics Denmark (E2015).

Sector	Gross Value Added [Million DKK]	%
Agriculture, Forestry and Fisheries	19,486	1.1%
Raw materials, industry and energy	335,668	18.8%
Construction	87,017	4.9%
Trade, transport and communication	427,415	23.9%
Finance and residential business	286,751	16.0%
Services	632,035	35.3%
Total	**1,788,372**	**100%**

2.1.6 Energy

Energy production and energy-consuming activities are the main contributors to the emissions of greenhouse gases in Denmark. In 2015 the energy sector alone (energy production, supply and fugitive) accounted for 27% of Denmark's total emissions of greenhouse gases (excluding LULUCF), primarily CO_2. In addition there are emissions from the energy-consuming activities in the transport sector, industry and households.

Production and supply

As can be seen from Table 2.4, Denmark's own production of energy grew more than 30-fold from 1980 to 2005. However, since 2005 the production of energy has decreased by almost 50% in total. Denmark is no longer 100% self-sufficient in energy, see Table 2.5. This is mainly due to the decrease in production of oil and gas in the North Sea. Renewable energy is increasingly contributing to the country's energy supply.

TABLE 2.4 ENERGY PRODUCTION (PJ)
Source: Danish Energy Agency (E2015)

	1980	1990	1995	2000	2005	2010	2013	2014	2015
Production, total	**40**	**424**	**655**	**1165**	**1312**	**979**	**703**	**678**	**675**
Crude oil	13	256	392	765	796	523	373	350	331
Natural gas	0	116	197	310	393	307	179	173	174
Renewable energy	23	45	57	76	106	131	135	139	155
Non-renewable waste	5	7	10	14	17	17	16	16	16

TABLE 2.5 DEGREE OF SELF-SUFFICIENCY (%)
Source: Danish Energy Agency (E2015)

	1980	1990	1995	2000	2005	2010	2013	2014	2015
Energy, total	**5**	**52**	**78**	**139**	**154**	**120**	**92**	**90**	**89**
Oil	2	72	105	203	226	168	133	127	118

Energy consumption

For 2015, 28.6% of the observed gross consumption of energy was supplied by renewable energy (according to the EU methodology 30.0% in 2015). The renewable energy resources are mainly wind energy and biomass, which are used to produce electricity, combined heat and power, or district heating. Internationally, Denmark is among the leading nations in wind energy.

Despite the economic growth, total energy consumption has remained largely unchanged at approximately 800 PJ since 1980, however with a decrease in the most recent years – partly due to an increase in net imports of electricity cf. Table 2.6 and partly due to energy savings cf. Table 2.7 (showing energy consumption adjusted for foreign electricity trade and climate fluctuations).

Denmark's dependence on oil and coal has fallen. In the production of electricity and heat in particular, oil and coal have been substituted with other fuels. Thus, natural gas and renewable energy are increasingly being used in district heating. For electricity, the share of renewables etc. has increased steadily since 1990.

TABLE 2.6 OBSERVED ENERGY CONSUMPTION (PJ)
Source: Danish Energy Agency (E2015)

	1980	1990	1995	2000	2005	2010	2013	2014	2015
Energy consumption, total	**830**	**752**	**841**	**816**	**835**	**846**	**762**	**720**	**720**
Oil	555	343	372	370	348	316	281	272	279
Natural gas	0	76	133	186	188	185	138	119	120
Coal and coke	252	255	272	166	155	164	136	107	76
Waste, non-renewable	5	7	10	14	17	17	17	17	18
Renewable energy	23	45	57	79	122	168	187	193	206
Net imports of electricity	-4	25	-3	2	5	-4	4	10	21

The distribution of gross energy consumption (energy consumption adjusted for foreign electricity trade and climate fluctuations) in 2015 was as follows: industry and agriculture accounted for 20%, the household sector for 31%, transport for 34% and commercial and public services for 13%. Non-energy purposes accounted for the remaining 2%.

TABLE 2.7 GROSS ENERGY CONSUMPTION, BREAKDOWN BY FUELS, ADJUSTED FOR CLIMATE FLUCTUATIONS AND NET IMPORTS OF ELECTRICITY (PJ)

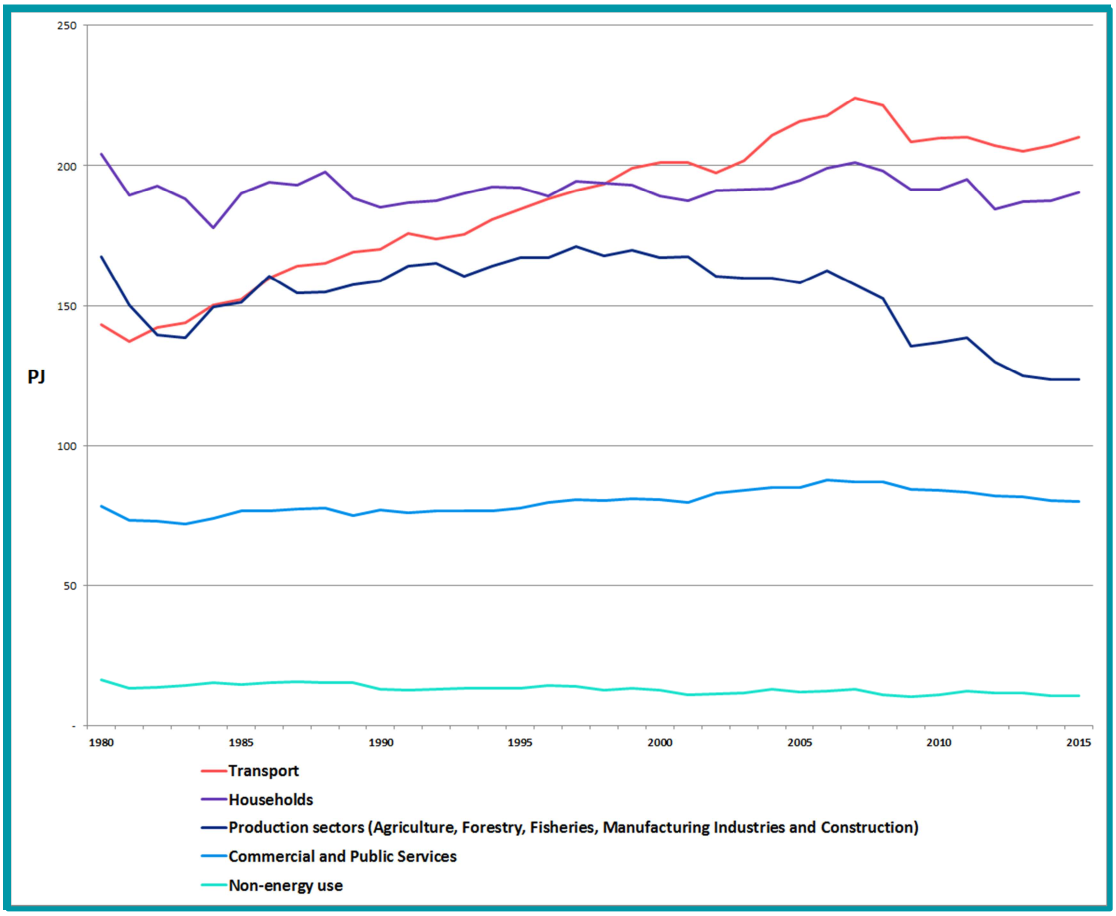
Source: Danish Energy Agency (E2015)

	1980	1990	1995	2000	2005	2010	2013	2014	2015
Gross energy consumption, total	**814**	**819**	**840**	**839**	**850**	**814**	**765**	**753**	**756**
Oil	546	355	374	376	352	312	281	275	280
Natural gas	0	82	134	192	192	176	140	130	133
Coal and coke	241	327	265	175	166	147	141	130	111
Waste, non-renewable	5	8	10	14	17	16	17	18	18
Renewable energy	22	48	57	81	123	163	187	201	214

Figure 2.6 shows adjusted energy consumption, sector by sector. Over the 35 years covered by the figure, consumption in the transport sector has risen, whereas consumption in the production sectors has fallen. Energy consumption in the household and service sectors as well as non-energy use has not changed much over the period, but some inter-annual variations can be seen.

FIGURE 2.6 ADJUSTED GROSS ENERGY CONSUMPTION, BREAKDOWN BY SECTOR

Source: Danish Energy Agency (E2015)



Structure of the market

The structure of the market in the energy sector is characterised by a division between production and supply of natural gas and oil, electricity, and district heating.

In connection with the implementation of the EU Directive on liberalisation of the electricity sector, a reform of this sector has also been carried out. This reform means full market opening and all electricity consumers have a free choice of electricity supplier.

Oil and gas supply

Oil and gas production activities in the North Sea continue to be of major importance to Danish society.

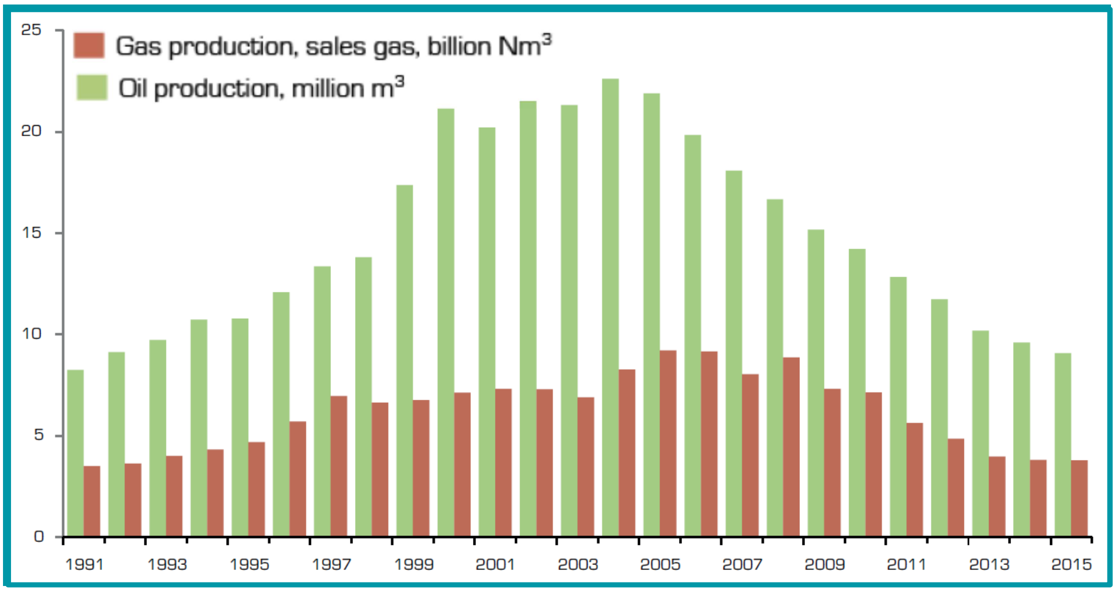
Oil production in 2015 totalled 9.1 million m^3, a 5.5% decline compared to 2014. The production of sales gas totalled 3.8 billion Nm^3 in 2015, similar to the production in 2014. The production of oil and gas from the Danish sector of the North Sea has now decreased approximately 60% since the production peaked in 2004-2005 as shown in Figure 2.7.

The development of existing and new fields may help to counter declining production.

In addition, the implementation of both known and new technology may help to optimize production from existing fields, and any new discoveries made as part of the ongoing exploration activity are expected to contribute with additional production.

FIGURE 2.7 PRODUCTION OF CRUDE OIL [MILLION M3] AND NATURAL GAS [BILLION NM3 SALES GAS] FROM THE DANISH SECTOR OF THE NORTH SEA

Source: Danish Energy Agency (January 2017)



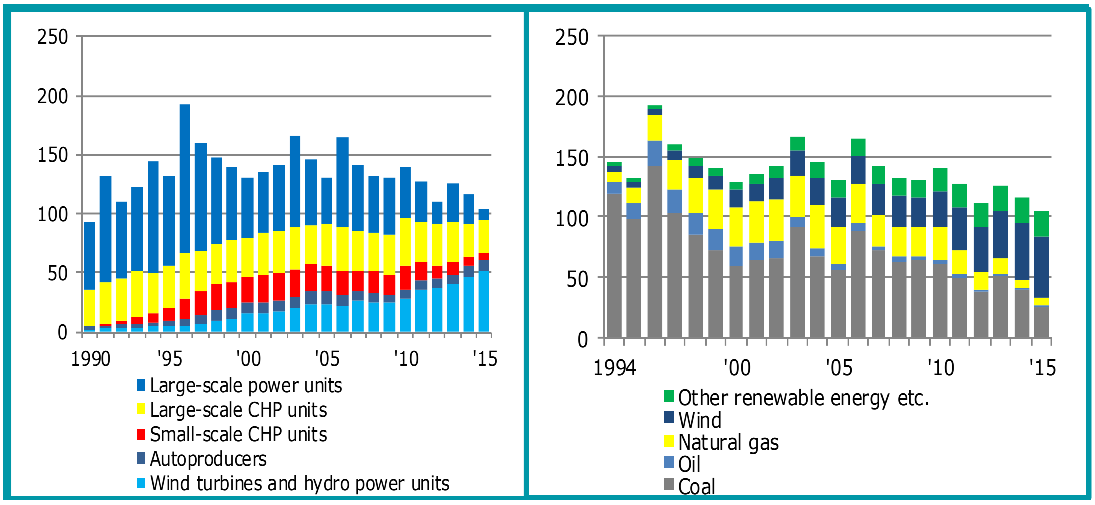
Electricity

In 2015 electricity production was 104.2 PJ, which is a decrease of 10.1% compared with 2014. As domestic electricity supply showed a slight increase, the reason for this decrease is primarily that Denmark had considerably higher net imports of electricity in 2015 opposed to 2014. In 2015 electricity was generated by wind turbines (48.8%), at large-scale power units (36% - of which 8.5% as separate production), by autoproducers (7.1% - i.e. small producers, whose main product is not energy) and at small-scale CHP units (6.0%). Large-scale power units generate electricity, partly as separate electricity production, and partly as combined electricity and heat production. Separate electricity production varies greatly from year to year due to fluctuations in foreign trade in electricity.

The developments in electricity production by type of producer and by fuel are shown in Figure 2.8.

FIGURE 2.8 ELECTRICITY PRODUCTION BY TYPE OF PRODUCER AND BY FUEL, PJ

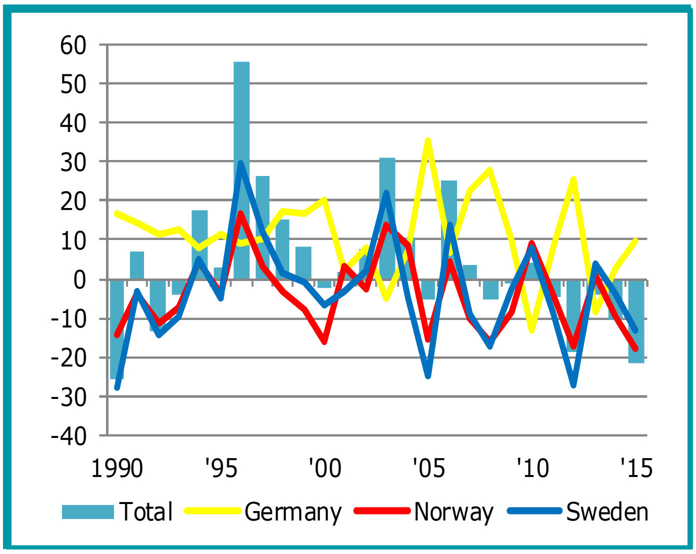
Source: Danish Energy Agency (E2015)



Danish foreign trade in electricity varies considerably from year to year. Foreign trade is strongly affected by price trends on the Nordic electricity exchange, Nordpool, which, in turn, is significantly influenced by varying precipitation patterns in Norway and Sweden, where electricity production is dominated by hydropower. In 2015, Denmark had overall net imports of electricity of 21.3 PJ. As shown in Figure 2.9 this was the result of net imports from Norway and Sweden of 17.8 PJ and 13.1 PJ, respectively and net exports to Germany of 9.7 PJ.

FIGURE 2.9 NET EXPORTS OF ELECTRICITY BY COUNTRY AS THE ACCUMULATED RESULT FOR THE YEAR (NEGATIVE = NET IMPORT FOR THE YEAR), PJ

Source: Danish Energy Agency (E2015)



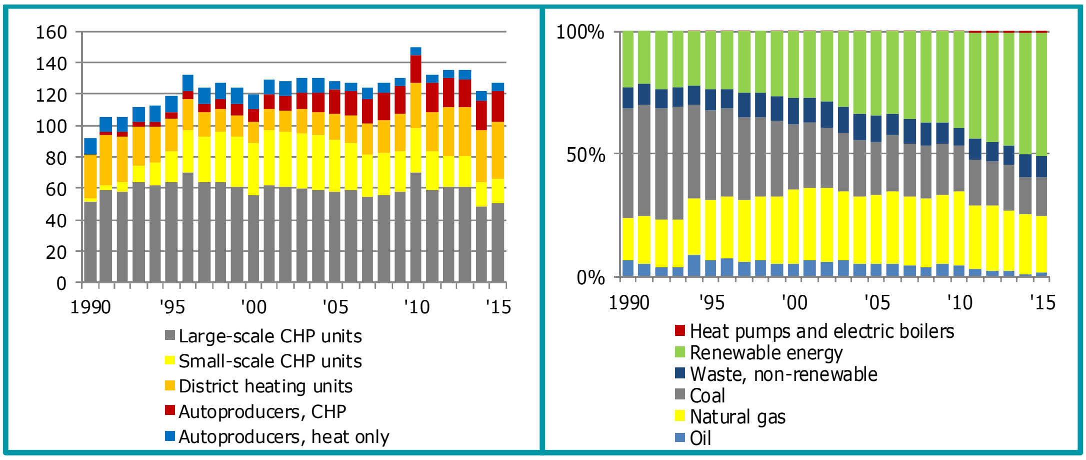
District heating

As of 1 January 2015 more than 63% of all dwellings were supplied by district heating. District heating production is generated at largescale CHP units, small-scale CHP units, district heating units and by autoproducers such as industrial enterprises, horticulture and waste treatment enterprises. The greatest contribution to district heating production comes from large-scale CHP units. Throughout the 1990s, the share produced at small-scale CHP units and by autoproducers such as CHP units, at CHP units at waste treatment facilities, in industry and in horticulture etc. increased.

However, in recent years production at small-scale CHP units has fallen, while production at district heating plants has gone up again. In 2015 total district heating production was 127.6 PJ, which is a 4.9% increase from 2014 and 38.1% increase from 1990. In 2015, approximately 50% of the district heating was produced from renewable energy sources of which biomass contributed with 47 percentage points.

The developments in district heating production by type of producer and by fuel are shown in Figure 2.10.

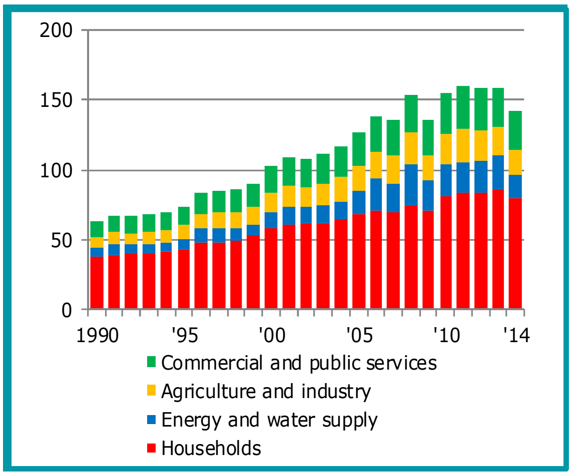
FIGURE 2.10 DISTRICT HEATING PRODUCTION BY TYPE OF PRODUCER [PJ] AND BY FUEL [SHARE IN %]
Source: Danish Energy Agency (E2015)



Prices, taxes and PSO

Energy prices are one of the key factors governing energy consumption. In 2014 spending on energy (all sectors excluding refineries), including taxes and VAT, amounted to DKK 142 billion. Of this figure, households paid DKK 80 billion, manufacturing industries DKK 19 billion, and the commercial sector and the service industries, including public services, DKK 27 billion. Energy expenses have been calculated based on purchase prices for the year, including taxes and VAT. For industries, as a general rule, a full refund of energy taxes (but not CO2 taxes) and VAT applies. As shown in Figure 2.11 energy expenses in current prices increased during the period from 1990-2014. The fall from 2008 to 2009 is due to a reduction in energy consumption. The reason for the large drop in expenses from 2013 to 2014 is a drop in consumer prices and lessenergy consumption, especially for heating.Figure 2.13 shows the development in fixed 2014 prices. The fixed prices have been adjusted for the change in general prices according to the consumer price index.

FIGURE 2.11 ENERGY EXPENSES BY INDUSTRY AND HOUSEHOLDS IN CURRENT PRICES, BILLION DKK
Sources: Danish Energy Agency (E2015) and Statistics Denmark

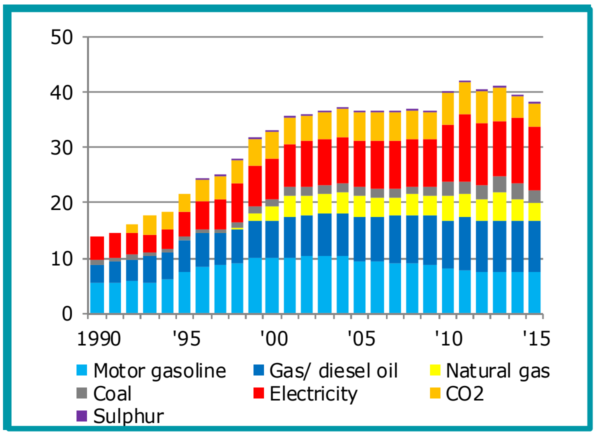


As an added incentive to enterprises to improve their energy efficiency and reduce Danish emissions of CO_2, a green tax package with gradually increasing taxes on CO_2 and SO_2 emissions as well as energy taxes was introduced in 1996. Enterprises with particularly high energy consumption can contract with the Danish Energy Agency on energy-efficiency improvements in return for a discount in CO_2 taxes and possibly heating taxes.

In 2015, revenues from energy taxes calculated in current prices were DKK 37.8 billion, which is a drop of 3.3% compared with 2014. In addition to energy taxes, revenues include CO2 and sulphur taxes. The largest contributions to revenues in 2015 is from electricity (DKK 11.5 billion), gas/diesel oil (DKK 9.4 billion), motor gasoline (DKK 7.4 billion) and CO2 taxes (DKK 4.2 billion). The 2015 revenues in current prices increased by 172% compared with 1990, when there were no CO2 and sulphur taxes. Gas/diesel oil, electricity and motor gasoline have seen growths of 198%, 167% and 30.4%, respectively, since 1990. In 2014 and 2015, energy, CO2 and sulphur taxes amounted to 4.0%, of total tax and VAT revenues in Denmark. The developments in the different taxes are shown in Figure 2.12 in current prices. The development in total revenue in fixed prices is shown in Figure 2.13.

FIGURE 2.12 REVENUES FROM ENERGY, CO_2 AND SULPHUR TAXES. CURRENT PRICES IN BILLION DKK

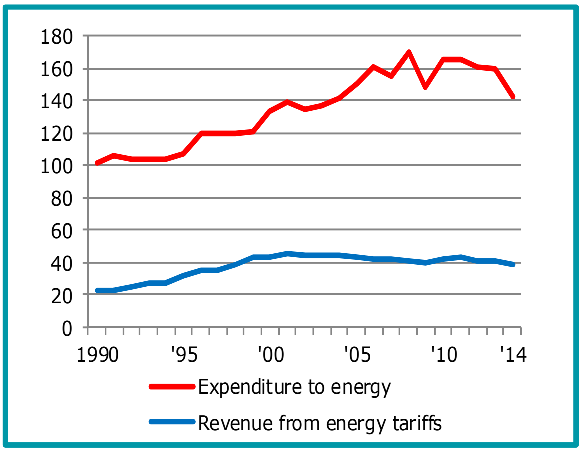
Source: Danish Energy Agency (E2015) and Statistics Denmark



In order to assess changes in energy expenses and tax revenues in relation to general price fluctuations, the figures have been converted to 2014 prices. Measured as 2014 prices, energy expenses in 2014 were 11.2% lower than in the previous year. Compared with 1990, energy expenses have risen by 39.3%. Revenues from energy taxes measured in 2014 prices rose by 74% from 1990 to 2013. Since 2005, revenues have remained at the same level.

FIGURE 2.13 ENERGY EXPENDITURES AND TAX REVENUES IN FIXED 2014 PRICES, BILLION DKK

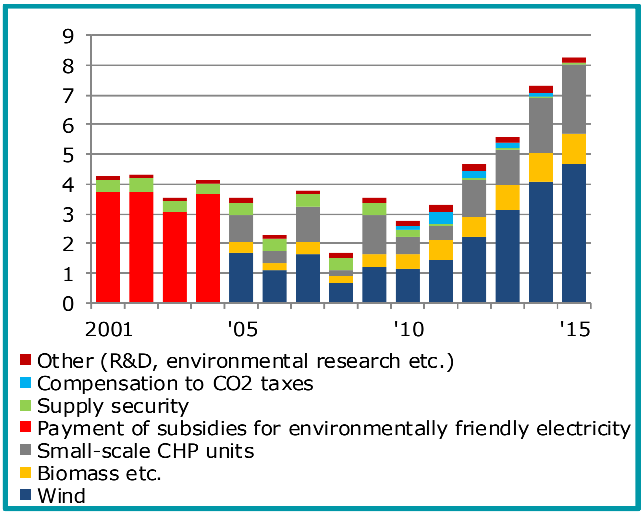
Sources: Danish Energy Agency (E2015) and Statistics Denmark



Total expenses for Public Service Obligations (PSO) in support of environmentally friendly electricity production were DKK 8.3 billion in 2015, compared with DKK 7.3 billion the year before. The increase in PSO expenses from 2014 to 2015 is attributable in particular to low prices on the electricity market and an increased wind power production. For 2015, total funding support for environmentally friendly electricity production was DKK 8.0 billion, divided between DKK 4.7 billion for wind power, DKK 2.3 billion for small-scale CHP and DKK 1.0 billion for biomass. The development 2001-2015 is shown in Figure 2.14. In 2010, compensation for CO2 taxes was introduced, but this compensation was cancelled at the end of 2014.

FIGURE 2.14 EXPENSES FOR PUBLIC SERVICE OBLIGATIONS (PSO) IN SUPPORT OF ENVIRONMENTALLY FRIENDLY ELECTRICITY PRODUCTION, CURRENT PRICES, BILLION DKK

Source: Danish Energy Agency (E2015)



Trade

The development in Denmark's imports and exports of energy 1990-2015 is shown in Table 2.8. In 2015 there was a surplus on foreign trade in crude oil, natural gas, and a deficit on foreign trade in oil products, coal, biomass/biofuels and electricity.

TABLE 2.8 IMPORTS AND EXPORTS OF ENERGY
Source: Danish Energy Agency (E2015)

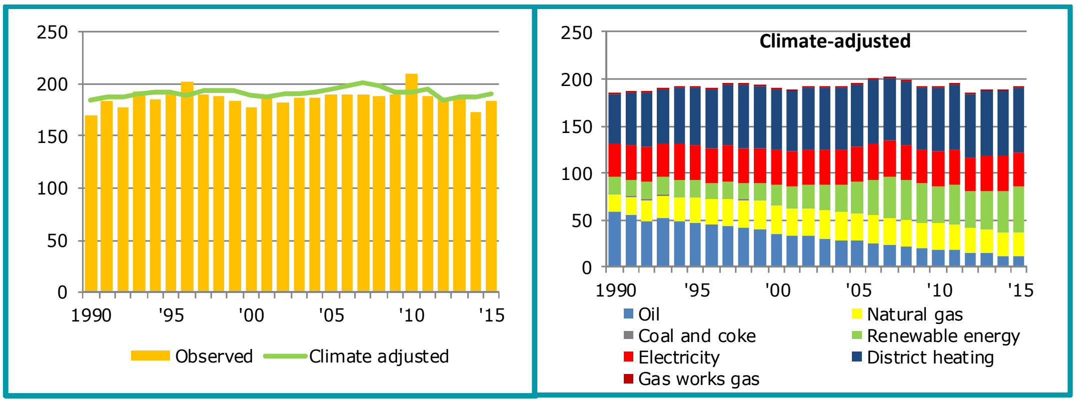
	Imports							
	1990	**1995**	**2000**	**2005**	**2010**	**2013**	**2014**	**2015**
TOTAL, PJ	**662**	**770**	**610**	**583**	**593**	**787**	**739**	**788**
Crude oil, PJ	174	229	159	117	117	201	149	179
Oil products, PJ	183	205	256	251	280	318	351	407
Natural gas, PJ	0	0	0	0	6	50	23	25
Coal and coke, PJ	262	321	161	149	112	122	113	67
Biomass and biofuels, PJ	-	0	2	19	39	55	58	54
Electricity, PJ	43	14	30	47	38	41	46	56
Electricity, Gwh	*11,973*	*4,013*	*8,417*	*12,943*	*10,599*	*11,459*	*12,702*	*15,645*
	Exports							
	1990	**1995**	**2000**	**2005**	**2010**	**2013**	**2014**	**2015**
TOTAL, PJ	**302**	**466**	**923**	**1020**	**736**	**690**	**647**	**690**
Crude oil, PJ	118	203	576	586	331	265	206	195
Oil products, PJ	126	183	195	178	226	302	324	375
Natural gas, PJ	39	63	121	210	132	83	78	82
Coal and coke, PJ	1	1	3	2	2	1	1	2
Biomass and biofuels, PJ	-	-	-	3	3	1	2	1
Electricity, PJ	18	17	28	42	42	37	35	35
Electricity, Gwh	*4,925*	*4,807*	*7,752*	*11,573*	*11,734*	*10,378*	*9,847*	*9,733*
	Net Exports (negative = Net Imports)							
	1990	**1995**	**2000**	**2005**	**2010**	**2013**	**2014**	**2015**
TOTAL, PJ	**- 360**	**- 304**	**313**	**437**	**144**	**- 97**	**- 93**	**- 98**
Crude oil, PJ	- 56	- 26	417	469	215	64	58	15
Oil products, PJ	- 57	- 23	- 61	- 74	- 54	- 16	- 27	- 32
Natural gas, PJ	39	63	121	210	127	32	55	58
Coal and coke, PJ	- 260	- 321	- 158	- 147	- 111	- 121	- 111	- 65
Biomass and biofuels, PJ	-	- 0	- 2	- 16	- 37	- 54	- 57	- 53
Electricity, PJ	- 25	3	- 2	- 5	4	- 4	- 10	- 21
Electricity, Gwh	*-7,048*	*794*	*- 665*	*-1,370*	*1,135*	*-1,081*	*-2,855*	*-5,912*

2.1.7 Household sector

Household energy consumption has been rather constant over the period 1990-2015 as shown in Figure 2.15. Compared with 1990, climate-adjusted energy consumption of households grew by 3.0%. The interannual variations show that household energy consumption is greatly influenced by the weather. The years 1990, 2000 and 2014 were very hot years with low energy consumption, whereas 1996 and 2010 were exceptionally cold. In 2015 climate-adjusted energy consumption by households was 190.6 PJ, accounting for 31.1% of total final energy consumption in Denmark. 158.1 PJ of the 190.6 PJ was used for heating and 32.5 PJ were used for electrical appliances etc. Households also consume a small amount of motor gasoline for garden tools etc., LPG (bottled gas) and gas works gas for other purposes, which in the energy statistics is included under road transport.

There have been significant changes in the composition of household energy consumption since 1990 as shown in Figure 2.15. Oil consumption decreased throughout the period shown due to a shift to district heating and natural gas. Firewood and wood pellets consumption has increased significantly since 2000[1]. In 2015 district heating amounted to 35.9% of household energy consumption, and renewable energy and electricity amounted to 25.4% and 19.3%, respectively. Consumption of natural gas, oil and gas works gas amounted to 13.4%, 5.8% and 0.2%, respectively. Household electricity consumption remained more or less constant in the period 1990 to 2001. Electricity consumption showed an increasing trend from 2002 to 2006, whereas consumption in the period from 2009 to 2015 has fluctuated around 36 and 37 PJ.

FIGURE 2.15 ENERGY CONSUMPTION IN HOUSEHOLDS – TOTAL AND BY ENERGY PRODUCTS, PJ
Source: Danish Energy Agency (E2015)

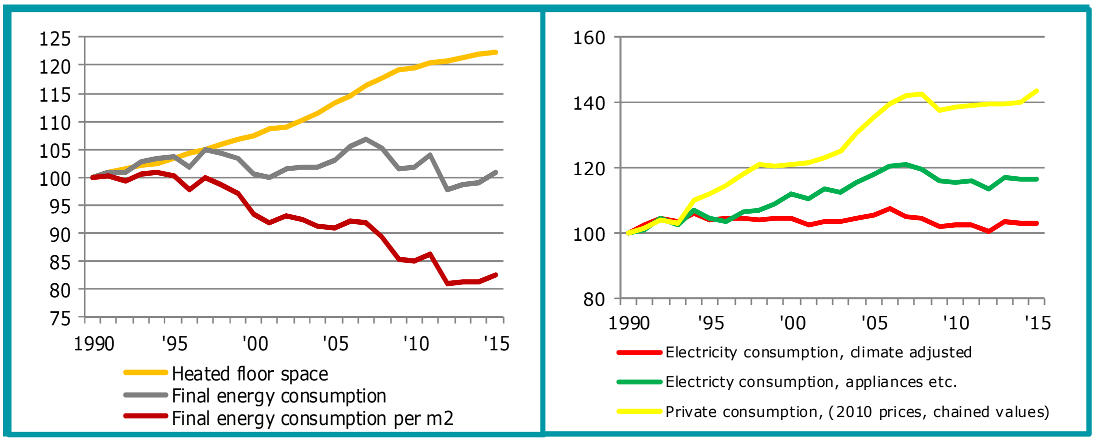


In the period 1990 to 2015, climate-adjusted energy consumption for heating (space heating and hot water) in dwellings has fluctuated around the level in 1990 (+8% / -3%) as shown in Figure 2.16. This is the combined result of a 22.4% increase in total heated area in the period and a 17.5% decrease in energy consumption for heating per m^2. The latter can be explained by improvements in the insulation of older dwellings as well as a shift away from old oilfired boilers to more efficient natural gas boilers and district heating installations. In addition, according to the building regulations, new homes must have lower energy consumption per m2 than existing homes.

Dispite the economic development with a 43.5% increase in total private consumption from 1990 to 2015, total household electricity consumption increased only by 3.2% in the same period as shown in Figure 2.16. This is partly due to a significant fall in electricity consumption for heating and partly due to significant falls in the specific electricity consumption of electrical appliances. From Figure 2.16 it can be seen that electricity consumption for appliances and lighting etc. increased only by 16.6% in the same period.

FIGURE 2.16 CHANGES IN ENERGY CONSUMPTION IN HOUSEHOLDS FOR HEATING COMPARED WITH THE AREA HEATED AND CHANGES IN ELECTRICITY CONSUMPTION FOR APPLIANCES ETC. IN HOUSEHOLDS, EXCL. ELECTRIC HEATING. INDEX 1990 = 100.

Source: Danish Energy Agency (E2015)



2.1.8 Transport

Denmark is a relatively small and densely populated country with a large share of the population living in cities.

In urban areas most people have good access to public transport and major investments in better public transport infrastructure are currently taking effect. The main railway connection between West and East Denmark will be improved in the near future and this is expected to reduce travel times substantially and attract more travellers in years to come. Furthermore, the Copenhagen Metro is being extended with a circle line and a new connection to the north of Copenhagen Harbour. However, in many rural areas, public transport is less frequent than in the urban areas.

In Denmark, many commuters use their bicycle to travel to and from work and for other purposes, particularly during the summer. Even though the cost of car ownership is very high in Denmark compared to neighbouring countries, there are approximately 2.4 mill. registered cars in Denmark.

Efficient and flexible transportation of goods and persons is a vital element of the foundation of the Danish welfare society. At the same time, transport as such is an important economic sector that contributes to economic growth, employment, and foreign trade.

Denmark's geography, with most people travelling short distances to and from work and a very high number of inhabited islands, makes Denmark an attractive country in which to use electric cars. The range of an electric car is sufficient to cover most people's daily transport needs.

In the 1980s a nationwide network of gas pipelines connecting the gas in the North Sea to individual consumers was established. The conditions for wider use of natural gas in the transport sector are in place. Also, since Denmark is a country with a large agricultural sector, there are good possibilities for production of biogas, which could be used for transport.

2.1.9 The business sector

Industry's production value accounts for about 19.2% of total Danish production. Table 2.9 shows that the largest industries in Denmark are the food, drink and tobacco, engineering, electronics, and the chemical industry.

TABLE 2.9 PRODUCTION VALUE BY INDUSTRY IN 2015, DKK MILLION (CURRENT PRICES).
Source: Statistics Denmark.

Manufacturing industry	**676,237**
Food, drink and tobacco	128,803
Textile, leather and clothing	8,875
Wood, paper and printing	30,663
Refineries	30,995
Chemical industry	39,122
Phamaceuticals	97,557
Plastics, glass and cement	40,311
Metal	54,962
Electronics	29,517
Manufacturing of electrical equipment	20,198
Machinery	122,097
Transport equipment	12,139
Furniture and Other industries	60,999

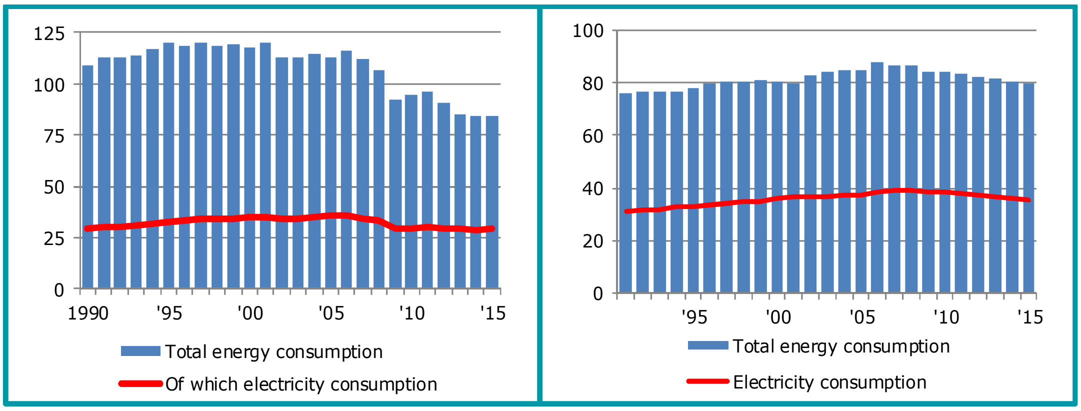
The total business sector (manufacturing, building and construction, together with commercial and public services) accounted for about 11% of Denmark's observed emissions of CO_2 related to total energy consumption in 2015.

In Denmark, the total business sector's observed final energy consumption accounted for about 28% of total final energy consumption in 2015, where manufacturing, building/construction and commercial/public services accounted for 14, 1 and 13 percentage point of total final energy consumption respectively.

The developments in final energy consumption in manufacturing industries and the commercial and public service sectors are shown in Figure 2.17. Compared with 1990 climate-adjusted energy consumption in manufacturing industries has decreased by 22.3% and electricity consumption by 1.1%. In commercial and public services sectors climate-adjusted energy consumption increased by 3.6% and electricity consumption by 18.4% compared with 1990. The growth in energy consumption by the service sector is due to high economic growth and reflects a development where services are becoming increasingly important in the economy. Primarily district heating and electricity consumption have been rising.

Figure 2.17 Energy and electricity consumption in manufacturing industries and the commercial and public service sectors, climate adjusted, PJ

Source: Danish Energy Agency (E2015)



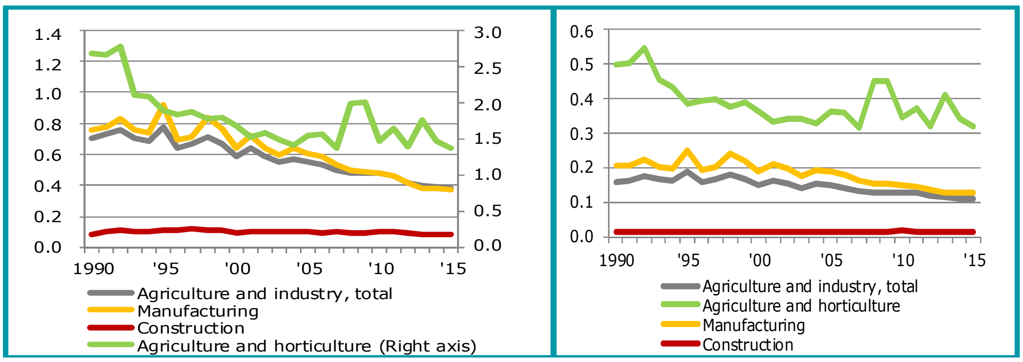
From the mid 1980s and to around 1990, energy intensity (energy consumption in relation to gross value added) for the business sector remained at the same level. Since 1990 the energy intensities in the different subsectors, except for construction, have shown decreasing trends as shown in Figure 2.18.

The change in the trends in energy and electricity intensities in the beginning of the 1990s corresponds with a move from a period of low economic growth to a period of high growth, implying better utilisation of production capacity. At the same time, from 1993 the first CO_2 taxes were introduced on energy consumption by businesses, with associated subsidies for energy savings, agreement schemes etc. Advice to businesses from electricity companies was also introduced in the early 1990s.

The main measures to curb the industrial sector's energy consumption have been based on the green tax package for businesses passed by the Folketing (parliament) in 1995. The package contained a combination of taxes and rebates for enterprises through, among other measures, government grants to promote energy savings by enterprises.

Figure 2.18 Energy and electricity intensity in agriculture and industry, climate adjusted, TJ per DKK million GVA (2010 prices, chained values)

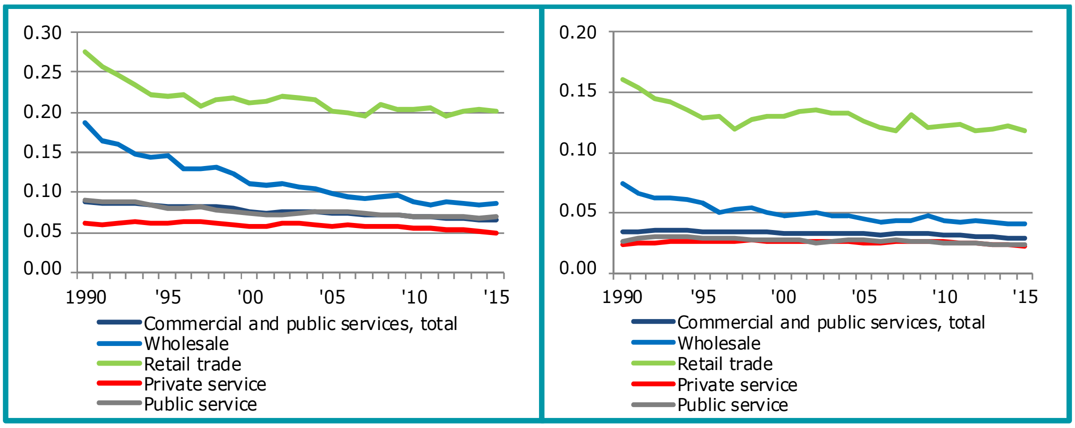
Source: Danish Energy Agency (E2015)



As shown in Figure 2.19, there has been a steady decrease in energy intensity for the commercial and public services sectors since 1990. Energy intensity in the commercial and public services sector fell by 26.4% from 1990 to 2015. In the same period also the electricity intensity fell in the commercial and public services sector, but only by 15.9%.

FIGURE 2.19 ENERGY CONSUMPTION AND ENERGY INTENSITY IN COMMERCIAL AND PUBLIC SERVICES, CLIMATE ADJUSTED, TJ PER DKK MILLION GVA (2010 PRICES, CHAINED VALUES)

Source: Danish Energy Agency



2.1.10 Waste

The waste sector's contribution to emissions of greenhouse gases consists primarily of methane and accounted for 2.0% of the total greenhouse gas emissions in 2015. Methane emissions come from the decomposition of organic waste at landfill sites and – to a minor extent – from wastewater treatment plants. In 2015 a total of 1,084,409 tonnes waste were landfilled in Denmark, corresponding to 10.5% of the total amount of waste[2].

Methane emissions from the waste sector are expected to fall in the future because the municipalities are now obliged to assign all waste suitable for incineration to incineration plants. This means that only a small quantity of organic waste will be deposited at landfills compared with the quantity deposited before the introduction of this obligation in 1997.

In addition, gas from a number of landfills is being used in energy production, which contributes to a direct reduction in methane emissions and an indirect reduction in CO_2 emissions.

Emissions of the industrial gases HFC and SF_6 from disposal of, for example, refrigerators and certain thermal glazing, which contain these substances, are included under the business sector.

There are also CO_2 emissions in connection with disposal of oil-based products, e.g. packaging, plastic bags, etc. Since waste incineration in Denmark is included in energy production, these CO_2 emissions must be included under the energy sector in accordance with the inventory rules from the IPCC.

Finally, in connection with incineration, a large amount of the waste is used as an energy source. As many of the incineration plants as possible have been converted to CHP production. In other words, the heat is used to supply district heating, and the electricity is sold to electricity suppliers. In 2015, 31 incineration plants in Denmark converted 33.6% of the entire waste production, or approx. 3,891,877 tonnes of waste. In 2015 waste incineration contributed with 5.6% of total primary energy production in Denmark.

2.1.11 Buildings and urban structure

One-twentieth of the area of Denmark is urbanised. 85% of Danes are town-dwellers, and most enterprises, institutions, etc., are situated in towns. Many air pollution problems are therefore concentrated in the towns.

On 1 January 2013, the total built-up area was 727.5 mill. m^2. Table 2.10 shows the distribution of the area between housing, factories, offices, etc.

TABLE 2.10 KEY FIGURES FOR THE STOCK OF BUILDINGS IN 2015 (1 JANUARY), MILL. M^2
Source: Statistics Denmark

Total building area	Buildings for year-round habitation	Factories and workshops	Commerce, trade and administration	Institutions and buildings for cultural and recreational purposes	Farm buildings
734.4	329.3	67.5	74.5	126.1	136.9

Today, about 4.4 Million m^2 are built per year. In recent years, house building has accounted for slightly more than half of all investment in building activities, and about half of the investment in the housing sector has gone on alterations and extensions.

Towns and cities are generally characterised by separation of residential and industrial areas, industrial buildings being situated in specially designated zones on the outskirts of the towns. The growth in the service industries and the growth in manufacturing with a small environmental impact imply new possibilities for integrating industry and housing, thereby reducing the need for transport between home and work.

Approximately two-thirds of the total building space is heated. The most important types of heating are district heating and central heating using gas and oil. Half of the heated space is heated by district heating and, as seen from Table 2.11, the use of both district heating and natural gas has increased at the expense of oil.

TABLE 2.11 DEVELOPMENT IN THE MAIN FORMS OF HEATING IN BUILDINGS, IN % OF TOTAL HEATED SPACE
Source: Statistics Denmark.

	1986	1991	1996	2000	2010	2011	2012	2013	2014	2015
District heating	33.1	38.6	44.0	48.1	50.3	50.6	51.0	51.3	51.1	52.1
Central heating with oil	51.3	37.4	28.6	25.0	18.0	17.3	16.6	15.9	15.2	14.5
Central heating with natural gas	1.5	9.0	13.4	15.8	18.4	18.5	18.6	18.6	18.6	18.6
Heating with electricity	6.4	7.7	7.9	7.8	7.0	6.9	6.8	6.8	6.7	6.7
Furnaces fired by oil and similar	2.0	1.5	1.2	1.0	0.7	0.7	0.6	0.6	0.6	0.6
Other heating[1]	5.7	5.6	4.9	4.6	5.6	6.0	6.4	6.7	7.1	7.5

[1] Central heating with solid fuel, furnaces fired by solid fuel, heat pumps and not specified.

2.1.12 Agriculture

Over the last 56 years the agricultural area in Denmark has fallen from 72% (30,900 km^2) of the total area in 1960 to 61% (26,226 km^2) in 2016. Table 2.12 shows the breakdown by type of crop over the last 45 years.

TABLE 2.12 USE OF AGRICULTURAL LAND. LIVESTOCK. AND NITROGENOUS FERTILISER
Source: Statistics Denmark

	1970	1980	1990	2000	2010	2015
Grain (%)	59	62	56	57	56	55
Pulses and industrial seed (%)	2	4	14	5	6	7
Root crops (%)	10	8	8	5	3	3
Grass and greenfeed in rotation (%)	17	14	12	16	21	19
Permanent grass (%)	10	9	8	13	8	10
Other crops (%)	2	3	2	4	6	6
Cattle ('000)	2,842	2,961	2,239	1,868	1,571	1,552
Pigs ('000)	8,361	9,957	9,497	11,921	13,173	12,538
Sheep ('000)	70	56	159	145	160	144
Poultry ('000)	19,169	15,507	16,249	21,830	18,731	17,523
Nitrogen in chemical fertilisers ('000 tonnes N)	271	394	395	234	197	197

The proportion of agricultural land under grass and greenfeed in rotation and permanent grass fell considerably from 1970 to 1990, but rose considerably during the 1990s, partly due to increasing use of grass fields for dairy farming, and partly due to the change in EU subsidy schemes, which means that grass or industrial seed must be grown on set-aside land. Furthermore the area with maize and cattle feed is included with the area with grass and greenfeed, and the area with maize has increased significantly from 0.4% of the agricultural area in 1980 to 5% in 2006. This is due in part to a warmer climate, which has made maize easier to grow.

From 1980 to 2015 the number of farms fell with 69% from 119,155 to 36,637. In the same period the average size of farms increased with 200% from 24 ha to 72 ha. This development has reduced the importance of agriculture as a source of primary employment. However, in the same period agricultural production has grown, both in quantity and value, and agricultural exports still make up a large proportion - 10% - of Denmark's total exports.

During the 1990s interest in organic farming increased considerably. In 2015 organic farms accounted for approximately 7% of land under cultivation.

During the last 40 years use of nitrogen by agriculture has varied greatly. Up to 1990 there was a big increase in the use of fertiliser (both manure and chemical, but during the 1990s use of fertiliser decreased considerably and has since 2003 stabilised.

The use of nitrogen originating from manure has dropped since 1980. Consumption of phosphorus and potassium in fertilisers fell throughout the period.

Cattle population fell by 45% from 1970 to 2015 cf. Table 2.12. Most of the cattle are dairy cows. Since milk production remained approximately unchanged throughout the period, the fall in cattle population is due to higher productivity per animal. In the same period, the pig population increased by 50%. The sheep population has more than doubled in relation to 1970, while the poultry population in 2015 was a little below the level of 1970. Since the 1970s, initiatives aimed at nutrients etc. have led to favourable trends, including with regard to greenhouse gases, where agriculture has reduced emissions by about 18.5% since 1990. Emissions of methan and nitrous oxide from agriculture (i.e. excluding emissions from energy consumption) accounted for approximately 21% of Denmark's total emissions of greenhouse gases in 2015.

2.1.13 Forestry

Approximately 15% of Denmark is forested. Originally focus was mainly on the production potential of primarily conifers, but in recent years focus has changed towards indigenous, deciduous tree species as offering greater long-term production and nature potential. Denmark's forests are managed as closed canopy forests. The main objective is to ensure sustainable and multiple-use management of the forests and to manage them in line with overall management of the countryside. Instead of clear-cut systems, forest owners are to a higher degree applying near-to-nature forest management regimes. Unlike our Scandinavian neighbours, in Denmark forestry does not play an important role in the national economy.

The Danish Forest Act protects a very large part of the existing forests against conversion to other land uses. This is also the case for afforested areas for which public subsidies are made available. In principle, this means that most of the forested land in Denmark will remain as forest.

The ambition is to have about 25% of Denmark's area forested by the end of the 21st century. A considerable increase in the forest area is therefore to be achieved.

Denmark is the only part of the Realm in which forestry is practised. Greenland and the Faroe Islands have almost no forest.

2.2 GREENLAND

2.2.1 Form of government and structure of administration

On 21 June 2009, the Act on Greenland Self-Government came into force. The Act recognises the Greenlandic people as a people pursuant to international law with the right to self-determination. It also establishes *Kalaallisut*, the Inuit language spoken in Greenland, as the official language. With Self-Government, Greenland is still within the Realm and shares some fields of responsibility with Denmark and the Faroe Islands, i.e. the Constitution, franchise and the eligibility for election, citizenship and central institutions like the National Bank. While Greenland has taken over responsibility for most domestic areas of governance, responsibility for the Supreme Court, foreign affairs, defence and security policy as well as exchange rate and monetary policy fall within the jurisdiction of the central authorities of the Realm.

Inatsisartut, the parliament, has 31 members. The members are elected directly at general elections held every four years. The last election was held on 28 November 2014. The parliament elects a government responsible for the central administration under the Premier.

The administration is been divided into eleven ministries. The Minister for Independence, Foreign Affairs and Agriculture represents Greenland in international negotiations on climate change. The Ministry of Nature and Environment has primary responsibility for coordination and implementation of legislation, plans etc. for the climate area.

Greenland Self-Government

The Act on Self-Government states that Greenland can have jurisdiction and financial responsibility for almost all aspects of public affairs if Inatsisartut, the Parliament, so decides. The Self-Government Act also outlines the future economic relationship between Denmark and Greenland. The Act states that Greenland has the right to utilise the mineral resources found in the subsoil. § 5 of the Self-Government Act specifies that Greenland will still receive an annual grant of DKK 3,600 mill. Future revenues from mineral and hydrocarbon activities will reduce the state subsidy by half the revenues exceeding DKK 75.0 mill. annually. Talks on the future relationship between Denmark and Greenland will commence when the annual block grant has been reduced to 0. The Act on Home Rule did not address the question of independence, but in accordance with § 21 of the Self-Government Act, the people of Greenland can decide on independence in the future.

International Relations

Greenland is not a member of the European Union, but Greenland participates in the Overseas Countries and Territories (OCT) scheme, that gives Greenland access to the European market. Greenland also has a commercial fisheries agreement with the European Union which also provides duty free access for fish, seafood and fishproducts. This agreement is one of the largest fisheries agreement of the European Union and is important as Europe is the primary market for Greenland's export of fish.

In accordance with the so-called *authorisation arrangement,* the Government of Greenland (Naalakkersuisut) may negotiate and conclude international agreements with foreign states and international organisations, including administrative agreements, which exclusively concern Greenland and entirely relate to fields of responsibility taken over by Greenland.

For agreements that fall outside the scope of the authorisation arrangement and which are thus concluded by the Danish Government, the Self-Government Act contains rules and regulations for the involvement of the Self-Government authorities. Accordingly, the Danish Government is required to notify Naalakkersuisut in advance of negotiations regarding agreements under international law which are of particular importance to Greenland. Before they are concluded or terminated, such agreements must be submitted to Naalakkersuisut for comments. If the Danish Government deems it necessary to conclude the agreement without the consent of Naalakkersuisut, this must, to the widest extent possible, have no effect for Greenland.

Denmark has ratified the Climate Convention with the consent of Naalakkersuisut. The Kyoto Protocol was ratified by Denmark in agreement with Greenland, on 31 May 2002. The Greenlandic Government has requested a territorial exemption for reduction commitments when Denmark ratifies the second commitment period of the Kyoto Protocol.

In August 2012 a cooperation agreement relating to the international climate change negotiations was signed by representatives from the Danish Government and the Government of Greenland. The agreement serves to facilitate closer cooperation on matters of mutual interest and to improve Greenlandic access to information and consultation in relation to the UNFCCC negotiations.

2.2.2 Population

The population of Greenland has increased by 12% since 1980. Today the total population is around 55,860 cf. Table 2.13. Of these 90% were born in Greenland.

TABLE 2.13 POPULATION OF GREENLAND (WITH 2030 PROJECTION)

Source: Statistics Greenland, 2017

	1980	*1990*	*2000*	*2010*	*2017*	*2030*
Population	49,773	55,558	56,124	56,452	55,860	53,993

Estimated changes in the population show a decrease towards 2030, but the proportion of the population born outside Greenland is not expected to change.

Migration and immigration patterns are dominated by the strong, historical connections between Greenland and Denmark. Every year throughout the period 1993-2016, more people moved away from Greenland than to Greenland. In 2016 a total of 2,451 people immigrated while 2,763 people emigrated. The net emigration in 2016 of 312 persons was the lowest number of annual net emigrations since 2012. The net emigration in 2012 of 709 persons was highest number of annual net emigrations since 1993.

The population density in 2017 was 0.14 per km^2 of ice-free area.

2.2.3 Geography

With an area of 2,166,086 km^2, Greenland is the world's largest island. It extends over almost 24 latitudes. The northernmost point is Cape Morris Jessup, only 740 km from the North Pole, while Cape Farewell in the south shares latitude with Oslo, Norway.

Greenland is covered by the Greenland Ice Sheet, a continuous, slightly convex ice sheet that covers 85% of the island and reaches heights of more than 3,000 m above sea level.

The coastal line stretches 44,087 km and is dominated by deep fiords and archipelagos. The population of Greenland lives mainly in the coastal regions, where there is little ice. Access to open waters implies good opportunities for fishery, hunting and transportation by sea, which are all important to Greenland society.

Greenland is surrounded by Atlantic and Arctic waters. The North Atlantic Ocean lays to the south and the Greenland Sea and the Denmark Strait to the east. The Denmark Strait is located between Greenland and Iceland and is 240 km wide. The west coast of Greenland meets the Davis Strait and Baffin Bay, and in the north, Greenland is separated from Canada by Smith Sound and Nares Strait. In Nares

Strait a mere 26 km separates Greenland from Ellesmere Island, Canada. North of Greenland lays Lincoln Sea and Wandels Sea in the Arctic Ocean.

2.2.4 Climate

Greenland has an Arctic climate. About 80% of the land is covered by an ice sheet that is up to 3 km thick, while the ice-free land areas are limited to a coastal strip that is 50-300 km wide. Furthest south, and closest to the edge of the ice, the climate is sub-Arctic with a mean temperature of more than 10°C in July. The climate in south-west Greenland, where most of the population of 55,000 live, is low-Arctic. This part of Greenland is characterised by relatively mild winters with a lot of snow and periods of thaw, and wet summers with average temperatures of less than 10°C in the warmest month.

North and north-east Greenland are in the high-Arctic zone. The climate has continental characteristics with very cold winters down to minus 50 degrees (Celsius) in north Greenland. The temperature is rarely above zero degrees from September to May. Winter precipitation is limited as parts of north Greenland has a desert climate with less than 25 mm precipitation per year, corresponding to about 1% of the precipitation at the southern tip of Greenland. The continental climate in high-Arctic Greenland is determined by sea ice from the Arctic Ocean, which hitherto has made up the pack-ice belt, often up to several hundred kilometres wide, which floats southwards along the east coast of Greenland. In recent years, the extent of the Polar Ice has been reduced for long periods, and this has led to unusual events such as wave erosion along the coasts which previously had not seen open sea to the same extent. The climate in high-Arctic Greenland is greatly influenced by the amount and spread of sea ice.

Atmospheric pressure

Atmospheric pressure is generally highest in April/May. The weather in Greenland is most stable at this time of year. After this, in the summer months, the variation in atmospheric pressure is small, but in winter it is much greater, with a generally higher atmospheric pressure towards the north than towards the south, leading to a higher frequency of cold winds from northerly directions and higher wind velocities.

The largest pressure extremes in Greenland occur in the winter period because of the large temperature contrasts in the atmosphere. The highest atmospheric pressure measured in Greenland was 1059.6 hPa, which was recorded in January 1958. The lowest was 936.2 hPa, recorded in 1986 and 1988.

Wind

Storms typically occur in connection with the passage of low-pressure systems. Between these systems, there are undisturbed periods of varying duration throughout the year, when the wind is governed by local conditions.

An example is the ice sheet's katabatic wind system, the extent of which is enormous. A katabatic wind is a wind that blows down an incline, moving from the central part out towards the edge. The wind velocity accelerates with increasing incline of the surface, and the topography can cause channelling, resulting in an extremely high velocity at the edge of the ice.

Greenland has many days with little or no wind. In some places on the east coast this is the case for 60% of the time.

Gusts can be very strong. Gusts of up to 75.1 m/s were measured in Danmarkshavn in 1975, but even stronger gusts undoubtedly occur in connection with the so-called piteraqs. These winds, which are katabatic, locally channelled winds from the ice sheet, occur in several locations in Greenland, and are characterised by a very abrupt change from light wind to storm.

Temperature

The summer temperatures on both the west and the east coast differ by only a few degrees from south to north, despite a distance of about 2,600 km. The reason for this is the summer midnight sun in north Greenland. Conversely, winter darkness and the absence of warm sea currents mean that the temperature during the winter period differs considerably from north to south.

There is also a big difference in the temperature conditions at the outer coast and inside the fjords. In summer, drift ice and the cold water along the coast can mean that it is warmer inside the fjords, while in winter, on the other hand, the presence of the sea makes it warmer in the coastal areas than inside the fjords.

Foehn winds can disturb this picture in the wintertime. Foehn winds are very common in Greenland, and in winter the hot, dry winds can cause the temperature to rise by 30ºC within a relatively short space of time, resulting in melting snow and ice. Relatively high temperatures in the winter period are very often the result of Foehn winds.

The highest temperature recorded in Greenland since 1958 is 25.9ºC. It was recorded in Manitsoq in July 2013. See Figure 2.20 and 2.21.

In Greenland, frost can occur in all the months of the year except deep inside the fjords at Narsarsuaq Airport and Kangerlussuaq for a couple of the summer months.

The coldest place in Greenland is naturally on the ice sheet, where the temperature can fall to below -70ºC. In the 1950's, a British research station measured -70°C and a DMI station measured below -63°C at Summit in the middle of the ice cap.

Apart from the ice cap, the coldest measured in Greenland are in Hall Land and Kap Morris Jesup on the north coast with lowest annual average mean temperatures close to -20°C (period 1982-1999). In January 1989, the lowest measured temperature at Hall Land was -52.1°C - possibly even lower as this type of station does not measure absolute minimum temperatures.

Seen in a long perspective, temperatures in Greenland in general have shown a slight upward trend. 2001-2010 was the warmest decade among all series. In 2010, record high annual temperatures were observed several places across Greenland.

In combined temperature series from southwest Greenland from the period 1784-2016, the 1930's, 1940's and 2010s were the warmest decades and the 1810's the coldest - not least due to unidentified large volcanic eruptions in 1809 and the Tambora eruption in 1815.

FIGURE 2.20 CLIMATOLOGICAL STANDARD NORMAL FOR NUUK 1981-2010

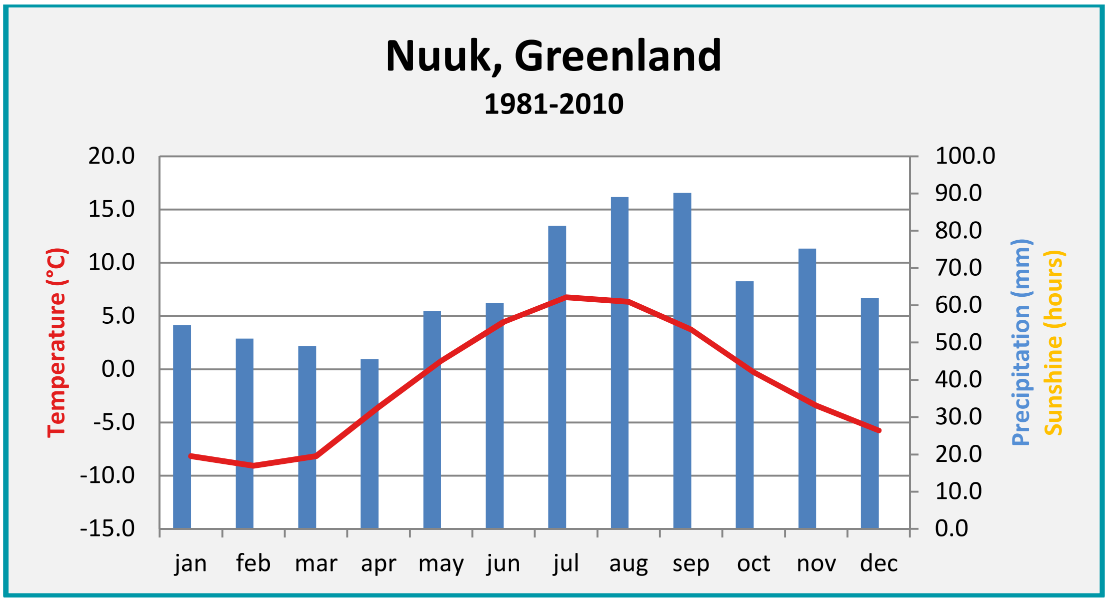
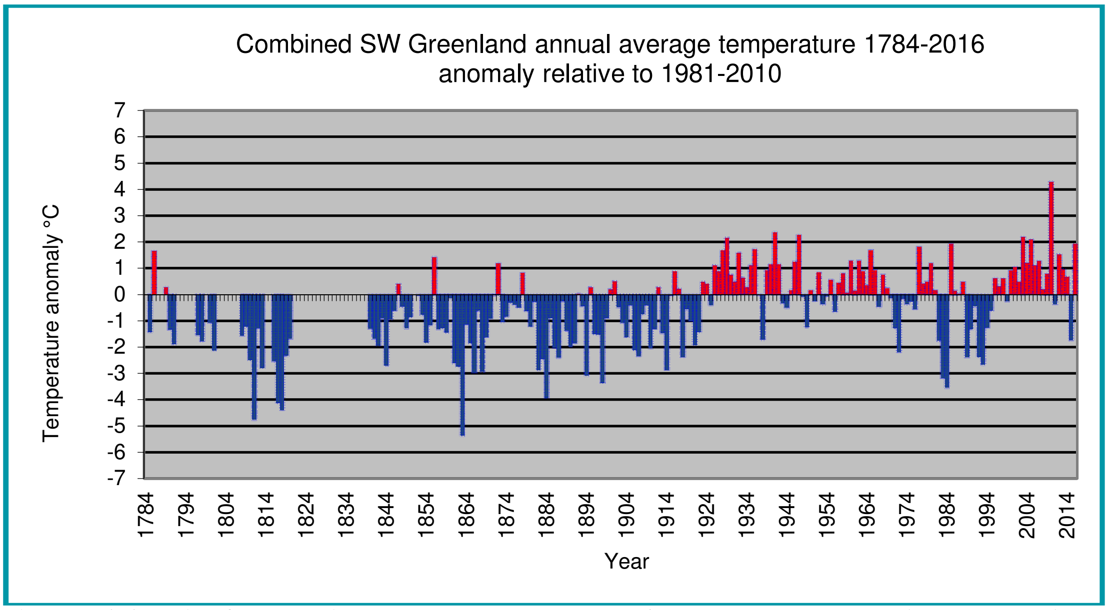


FIGURE 2.21 ANNUAL AVERAGE TEMPERATURE 1784-2016 IN °C FOR A COMBINED SW GREENLAND SERIES; ANOMALY RELATIVE TO 1981-2010.

Source: Cappelen 2017c



There are missing values for some early years 1784, 1787-1789, 1792-1796, 1799, 1802-1807, 1814-1815, 1821-1839, 1851.

In recent years several warm summers in Greenland have been registered. In 2012, such a summer was followed by a number of unusual melting events, also in the middle of the ice sheet (Summit). Events in Greenland during warm summers like 2012 cannot be regarded as 'unnatural', but on the other hand there is an indisputable gradual rise in temperature in Greenland and along the way, any 'warm incident' thus will have an increased likelihood of becoming a little hotter than the preceding one.

Precipitation

Recorded precipitation in Greenland decreases with rising latitude and from the coast to the inland area. Particularly for southern stations there is considerable seasonal variation. See Figures 2.20, 2.22 and 2.23.

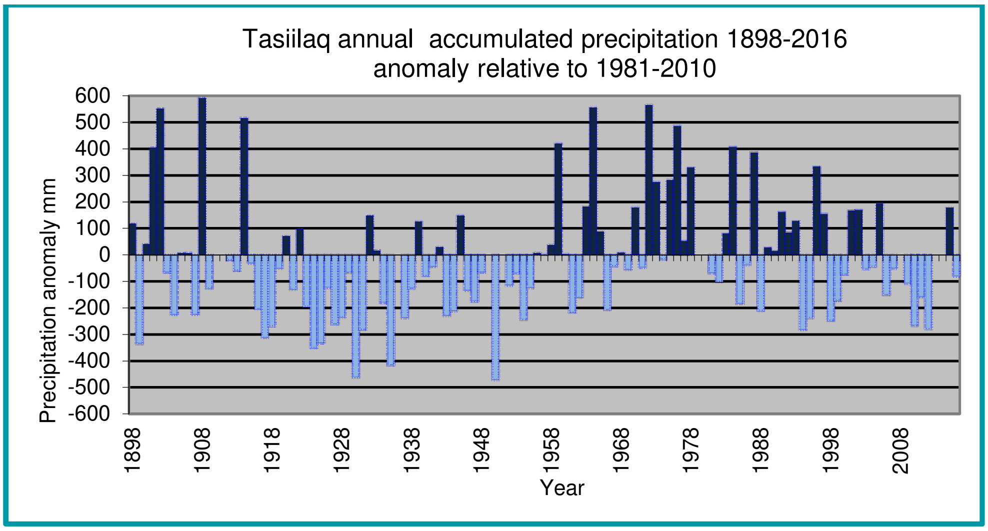
In the extreme south and particularly in the south-eastern region, precipitation is significant, average annual precipitation ranging from around 800 to 2,500 mm along the coasts. Further inland, towards the ice sheet, considerably less precipitation is recorded. In the northern regions of Greenland there is very little precipitation, from around 250 mm down to 130 mm per year. In a few places there are arctic deserts, i.e. areas that are almost free of snow in winter, and where evaporation in summertime can exceed precipitation.

Not surprisingly, snow is very common in Greenland. In fact, at most stations in the coastal region it can snow all year round without snow cover necessarily forming. There are thus many days with snow during the year, mostly in the southern part of the country. The snow depth is greatest in southern Greenland, averaging from one to more than two metres in all the winter months and sometimes reaching up to six metres. In southern Greenland the snow cover can disappear altogether during the winter in connection with warm Foehn winds.

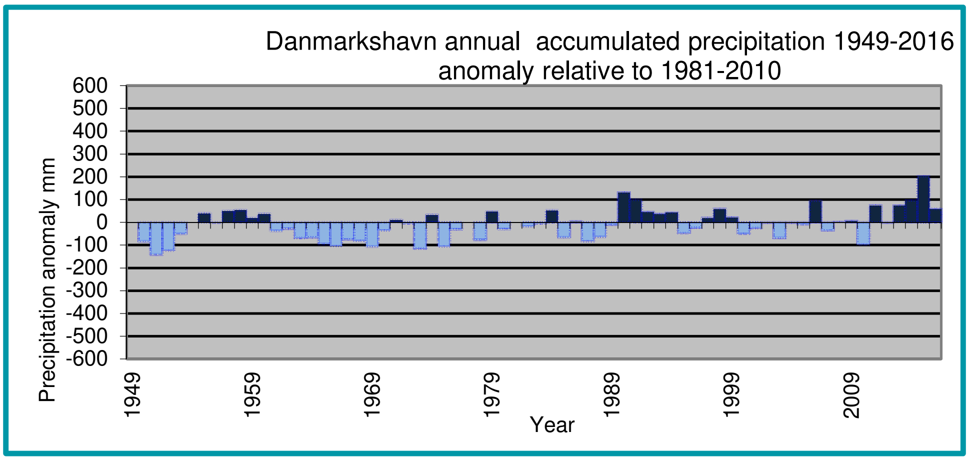
Towards the north, snow cover has already formed in most places by September and normally disappears again in June/July.

FIGURE 2.23 ANNUAL PRECIPITATION IN TASIILAQ 1898-2016 (TOP) AND IN DANMARKSHAVN 1949-2016 (BOTTOM) IN MM, ANOMALY RELATIVE TO 1981-2010.

Source: Cappelen 2017c



Data are missing for the years 1910-1911, 1936, 1949, 1951, 1979-1980, 2008 and 2013-2014.



Data are missing for the years 1949, 1954, 1977 and 1981.

Hours of sunshine

The part of Greenland north of the Polar Circle, 66.5°N, has midnight sun and polar night of varying length depending on the latitude. Midnight sun means that the sun is in the sky 24 hours a day, while polar night means that the sun does not rise above the horizon at all.

Despite the polar night, the northern stations have more hours of sunshine than the southern stations. This is due to the "long" day, of course, but also to generally less cloud cover. However, although the surface of the soil receives more solar heat than in the tropics at around the summer solstice because of the long day, a considerable part of the energy is reflected because of the oblique angle of incidence and the snow-and-ice-covered surfaces.

2.2.5 Economy

The economy of Greenland is a small-scale economy based on trade with other countries (see Table 2.14 for key figures).

Under the Danish Realm, Greenland received an annual state subsidy to finance fields of responsibility assumed from Denmark. Under Self-Government, Greenland will still receive an annual grant, but the new fields of responsibility must be financed by the Greenland Government. Future revenues from mineral activities in Greenland will reduce the state subsidy by half the revenue exceeding DKK 75 mill.

TABLE 2.14 KEY FIGURES FOR THE GREENLAND ECONOMY IN 2006, 2008, 2011, 2014 AND 2015. CURRENT PRICES (EXCEPT FOR GDP) IN DKK MILLION.

Source: Statistics Greenland (2017)

	2006	*2008*	*2011*	*2014*	*2015*
GDP[1]	11,940	12,444	12,165	12,863	13,076
State subsidy (block grant)	3,120	3,301	3,533	3,642	3,678
Imports	4,054	4,702	5,350	4,866	4,487
Exports	2,343	2,471	2,636	3,139	2,738
Public expenditure	7,983	8,798	9,346	10,139	10,122
Annual growth in GDP	7.1 %	3.6 %	1.5 %	-0.8 %	1,7 %

[1] 2010 prices, chained values.

The 2015 national budget of Greenland saw a GDP of DKK 217,800 per capita.

Exports

The fishing industry is of immense importance to the economy of Greenland, as fish and seafood are the only large-scale export from Greenland (see Table 2.15). The estimated relationship between GDP and the real export value of fish and seafood shows that a 1% increase in the export value of fish and seafood leads to a 0.29% increase in Greenland GDP, according to time series data ranging back to 1966. Therefore, changes in both the world market prices and the availability of important stocks of fish are important to the entire economy.

Commercial hunting is common in the northern and eastern parts of Greenland and locally the income from hunting is important to the wellbeing of the community, but hunting does not contribute extensively to the national economy.

TABLE 2.15 VALUE OF EXPORTS IN 2000, 2007, 2012 AND 2016 IN DKK MILLION (2010-PRICES, CURRENT VALUES).

Source: Statistics Greenland

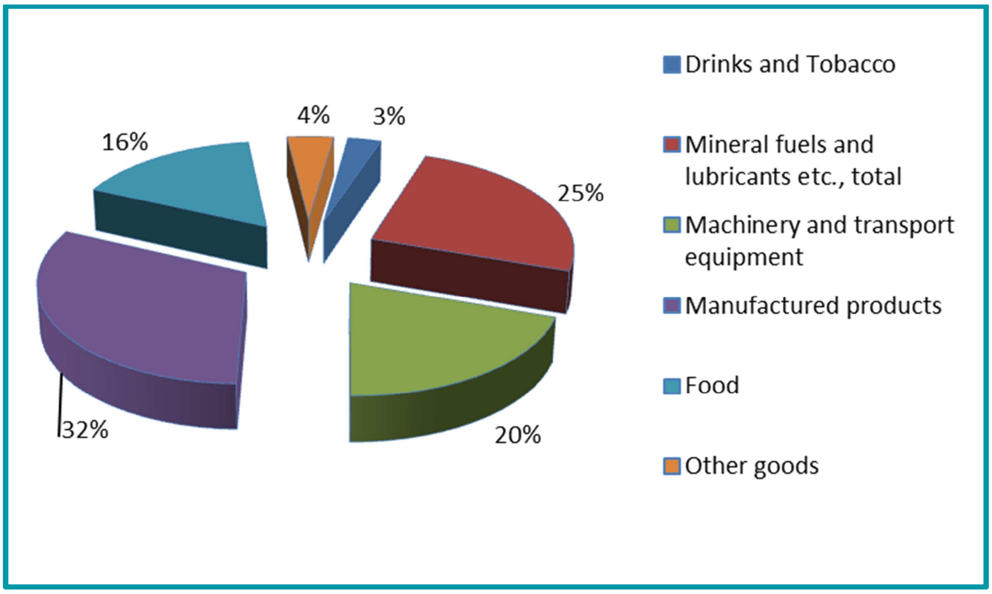
	2000	*2007*	*2012*	*2016*
Total value of exports	2,205	2,326	2,782	3,698
Total value of export of food, fish and seafood	2,119	1,917	2,529	3,435
Value of export of single stocks as share of total value of export of fish and seafood				
Northern shrimp	63.4 %	59.0 %	56.0 %	44.0 %
Atlantic cod	2.5 %	9.4 %	6.7 %	11.2 %
Greenland halibut	17.2 %	23.0 %	26.0 %	31.3 %
Snow crab	10.8 %	1.9 %	1.7 %	1.7 %
Other	6.1 %	6.5 %	9.5 %	10.9 %

Imports

As the inland production is limited, Greenland is an open economy depending on imports of a wide range of goods (see Figure 2.24).

FIGURE 2.24 IMPORTS IN 2016

Source: Statistics Greenland. 2017



2.2.6 Energy

Greenland has high basic energy demands. Expenditures related to transportation and energy supply are considerable due to the large size of the country, the widely dispersed population and the Arctic climate.

For the past decade, Greenland has been investing significantly in hydropower, and today more than 50% of the national energy supply is based on renewable sources. Despite these investments, Greenland's CO_2 emissions have been increasing until 2011, since when emissions have reduced. Greenland is still very dependent on the import of fossil fuels.

Energy production and supply

Because of the vast distances between towns in Greenland, it is neither financially nor technically viable to establish a supply grid connecting them. This means that each town and settlement has its own power plant or combined heat and power plant (CHP plant) – a so-called island operation. At the same time, the climatic conditions mean that towns and settlements cannot bear lengthy interruptions in their electricity supply. Therefore it is also necessary to have reserve and emergency plants. There is only one power plant that supplies two towns: the Qorlortorsuaq hydropower plant, which has supplied both Narsaq and Qaqortoq in South Greenland with electricity since 2008. In both towns there are still back-up plants.

Hydropower generation

Greenland has invested in renewable energy since the 1990s with annual investments making up 1% of GDP. Priot to 1993, all energy production for electricity and district heating was based on diesel-driven power generation and CHP plants. Today five hydropower plants cover 50% of total energy supply and contribute to an increasing degree of self-sufficiency in the energy sector cf. Table 2.16.

TABLE 2.16 GREENLAND'S HYDROPOWER PLANTS IN 2017

Source: The Department of Environment and Nature, Government of Greenland (2017)

Name	**Area of Supply**	**In Operation Since**	**Capacity in Megawatt**
Buksefjorden	Nuuk	1993	45 MW
Tasilaq	Tasiilaq	2004	1.2 MW
Qorlortorsuaq	Narsaq og Qaqortoq	2008	7.6 MW
Sisimiut	Sisimiut	2010	15 MW
Pakitsoq	Ilulissat	2013	22.5 MW

Preliminary studies of hydropower potentials continue, but no large-scale hydropower plants are expected in the next couple of years.

Fossil-fuel-based power generation

Greenland is still very dependent on the import of fossil fuels for power generation. Today, approximately 39% of the total energy supply from the public utility company Nukissiorfiit is based on oil, which is largely a reflection of the island-operation system, in which most settlements outside the larger towns depend on fuel-based power generation.

District-Heating

The production and supply of heating takes place in a number of ways. Integrated supply facilities for heating and electricity exist in a number of places, where hydropower plants and fuel-based power plants generate surplus heat, which is then used for district heating. In addition, waste incineration contributes to the heating supply in a number of towns and settlements.

An increasing share of the heating supply is based on surplus hydroelectricity from the five hydropower plants. When these are already operating on maximum capacity , oil boilers supplements to the demand in order to secure stable supply.

Finally, a considerable amount of the heating supply, especially in smaller settlements, is still based on fuel-based district heating systems. This is largely a consequence of the island-operation system, where large-scale power generation facilities are not technically or financially viable.

Energy consumption

Energy consumption increased significantly from 1990 until 2011, especially in 2010 and 2011 due to the growth in geological surveys, which are very fuel-intensive. As a result Greenland experienced the largest consumption ever recorded in 2011 (11,071 TJ). Since 2011 there has been no oil exploration. This standstill combined with an economic recession has caused a drop in total energy consumption in 2012-2014 to 2009-levels. In 2015 energy consumption increased by 1.7% to 8,626 TJ (see Table 2.17 and Figure 2.25), which is comparable to 1990 levels.

Despite an increase in the production of renewable energy over the last decade, Greenland is still dependent on imports of fossil fuels. With a total share of approximately 82%, the large majority of energy consumption is based on fossil fuels. This includes consumption in households, production industries, energy and water supply, the transportation sector, public and private services as well as wholesale and retail.

In 2010 and 2011 emission of greenhouse gasses increased significantly due to an increase in fuel combustion caused by the initiation of oil exploration. This caused emissions from energy consumption to rise by 14.5% in 2010 and by 6.9% in 2011. Due to the absence of oil exploration since 2011, emissions from energy consumption has now dropped below 1990 levels to 523,962 ton CO_2-equivalents in 2015.

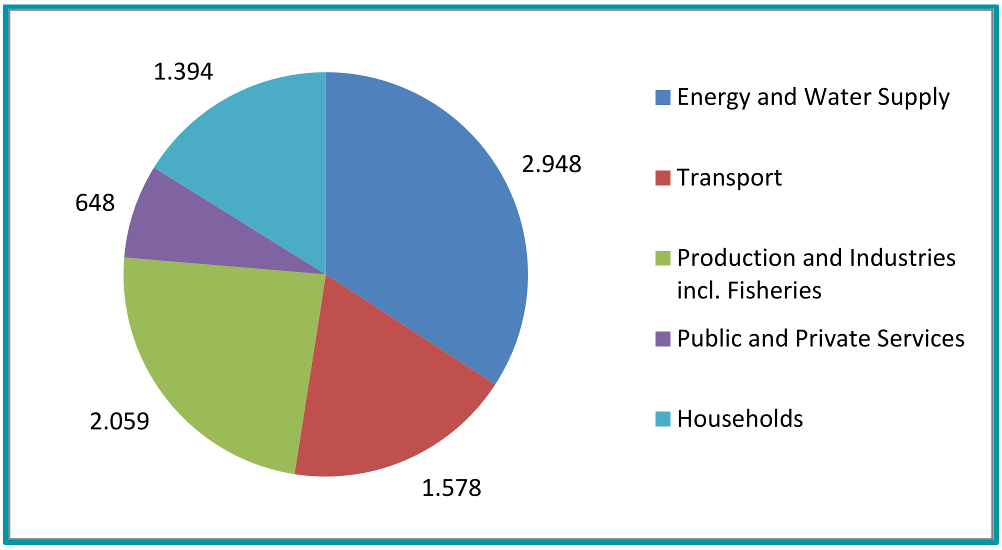
TABLE 2.17 ENERGY CONSUMPTION BY SOURCE IN 2010 AND 2015

Source: Statistics Greenland based on information from Polaroil A/S, Statoil A/S and Nukissiorfiit.

	2010 Unit GJ	2015 Unit GJ	2010 Unit GWh	2015 Unit GWh
Hydropower	1,011,600	1,480,486	281	411
Energy recovered from waste	89,745	97,520	25	27
Petroleum	838,911	701,860	233	195
Solar	7,720,353	5,302,065	2,145	1,473
Fueloil	49,993	446,503	14	124
Gasoline	584,965	585,188	162	163
Liquified petroleum gas (LPG)	4,220	3,343	1	1
Wasteoil	9,319	9,242	3	3
Consumption of energy, total	**10,309,106**	**8,626,206**	**2,864**	**2,396**

FIGURE 2.25 DISTRIBUTION OF GROSS ENERGY CONSUMPTION IN 2015

Source: Statistics Greenland: Greenland's Energy Consumption 2015.



2.2.7 Transport

Passenger transport is primarily by air, although one ferry and a number of small passenger vessels operate in Greenland waters (see Table 2.18).

TABLE 2.18 VESSEL DATA SUMMARY

Source: Ministry of Health and Infrastructure, Government of Greenland and Marine Rescue Coordination Center Nuuk

		2008	2010	2012	2016
Research/ Ice breakers/ Government	Private ice breakers	2	3	1	0
	Research vessels	23	22	24	24
	Special purpose vessels	10	24	14	0
Shipping	Bulk carriers and container ships	24	24	21	32
	Tankers	6	10	6	5
Passenger Transport	Ferry	1	1	1	1
	Passenger vessels	11	-	10	12
	Passenger cruise ship	36	38	30	42
Fishing	Large commercial fishing vessels	10	29	23	25

Passenger transport by air

The regions of Greenland are connected by ships, aeroplanes and helicopters.

Since the 1990s, Greenland has seen an increase in both sea and air passenger transport, and the need for flexible and fast transport between the towns has increased in parallel to the general development of society.

Year-round scheduled air services connect Greenland with the outside world, through Copenhagen, Denmark and Reykjavik, Iceland.

Passenger transport by land

There are no roads connecting towns and settlements in Greenland, but in most towns there are bus services. Private car ownership is common and the number of taxies is generally high.

In 2016 there were 8,078 vehicles registered by the motor vehicle administration. Greenland had 4,186 cars, 189 taxis, 76 buses, 164 fire engines, 1,315 commercial vans and trucks, 2 motorcycles, 1,179 snowmobiles/snowscooters and 967 “others” .

Passenger transport by sea

Passenger transport by sea is serviced by one ferry and 12 small vessels, operating in Greenland waters. The ferry sails along the west coast of Greenland, while passenger vessels carry both passengers and goods between towns and settlements.

Private boat ownership is common and boats are used for local transportation as well.

Cruise ship tourism

Greenland has seen an increase in tourism since the turn of the century, and especially cruise ship tourism has increased. The number of cruise ships sailing in Greenland has been increasing year by year, but has fallen recently and in general cruise ships have experienced much volatility in passenger demand. With the rise of commercial tourism there has been increased focus on cruise ship activity and the protection of the arctic environment and nature. In 2016 a total of 42 cruise ships operated in Greenland waters, carrying 24,244 passengers.

Shipping

Royal Arctic Line (RAL) is the major shipping agent in Greenland, enjoying a government-issued concession that gives it a virtual monopoly on containerized shipping. Royal Arctic Line connects Greenland with Europe, primarily through the port of Aalborg in Denmark and Nuuk in Greenland. Almost all cargo to and from Greenland passes through this route. New routes via Reykjavik, Iceland, are under consideration.

Greenland experienced an increase in shipping during the mid-00s, attributed to an increase in exports of fish and shrimp and increased imports of consumer goods, machinery and materials for construction. In recent years commercial shipping activity has declined from the high in 2008. This appears to be due to a decrease in commerce overall rather than an indication of declining importance of the shipping trade in Greenland.

The planned production of aluminium and the opening of large-scale mining are likely to greatly increase shipping between Greenland and world markets, in particular to Europe and North America.

2.2.8 Industry

Greenland has a small inland production of industrial produce and exports are based almost entirely on fisheries, while most industrial produce is imported.

Fishery

Fish and seafood is the single most important export commodity in Greenland that consists of more than 250 species. In 2016 over 92 % of the total export value was connected to fisheries. The main catches connected to this are prawns, halibut and cod which consist of the export value. Fishing activities are conducted both on-shore and offshore where fishermen process their catches in production facilities on land or on-board their fishing vessels. The main economic activity in Greenland is fishing and it is mainly concentrated on the west coast.

Mineral and hydrocarbon industry

The mineral and hydrocarbon industry is developing, and the industry might be of crucial importance to the industrial development of Greenland.

The Greenland Government, has issued a series of licences for the exploration of oil, gas and minerals (see Table 2.19).

The exploration activitives have shown that there are economic potentials related to a wide range of mineralisations. The current exploitation licences are targeted at the exploitation of gold, zink/lead, iron, gold and anorthosite, and promising exploration projects are targeting eudialyt, rare earth elements, nickel and other minerals.

In 2017, the ruby and sapphire mine at Fiskenæsset started production. The mine is located south of Nuuk and has production facilities at the mine site and in Nuuk.

Other projects have been granted an exploitation licence:

- White Mountain, a very large anothosite deposit, located near Kangerlussuaq.In September 2015, the company Hudson Greenland A/S was granted an exploitation licence. Construction of infrastructure has started and the company plans to start production in 2018.
- Citronen Fjord, a giant zink and lead deposit of more than 130 million tonnes ore. The project is located in the Northeast of Greenland. An exploitation licence was granted in December 2016 and the company Ironbark A/S is currently seeking funding and are developing the construction plans.

TABLE 2.19 MINERAL ACTIVITIES: PROSPECTING, EXPLORATION AND EXPLOITATION LICENCES IN 1995, 2000, 2004, 2008, 2012 AND 2016.

Source: Mineral Licence and Safety Authority, Greenland Government

	Prospecting licences	*Exploration licences*	*Exploitation licences*	*Small scale licences*
1995	21	35	-	-
2000	15	24	-	-
2004	12	22	1	-
2008	12	68	3	-
2012	25	79	4	12
2016	11	58	7	49

Moreover, a series of mature exploration projects are getting closer to exploitation. Licences to exploit mineral resources are granted by Nalaakersuisut after an extensive process, including public consultation of an EIA (Environmental Impact Assessment) and a SIA (Social Impact Assessment). For each project an IBA (Impact Benefit Agreement) is signed by the company, the municipality and Nalaakersuisut to ensure benefits from the projects for the local community and Greenland as a whole. The IBA is adjusted annually.

Currently the following projects are approaching maturity:

- Killavaat Alannguat, a worldclass REE (rare earth elements) deposit. The exploration licence was granted to Tanbreez Mining Greenland A/S. The company submitted an application for exploitation in Q3 2013. The resource is estimated at around 4 billion tonnes of ore. The deposit is situated in South Greenland and is expected to employ approximately 60-80 people in an open-pit operated all year round. Mine life is expected to exceed 20 years.
- Isua, a BIF (Banded Iron ore Formation) with an ore tonnage of more than 1.1 billion tonnes has been explored by the British company London Mining Ltd. During the last quater of 2013, London Mining was granted an exploitation licence by Naalakkersuisut.. The deposit is situated close to Nuuk, the capital, and is expected to employ 6-700 people in an open-pit all year operation. Mine life is expected to exceed 15 years.
- Greenland Minerals and Energy Ltd., an Australian company, is currently exploring Kuannersuit, a REE and uranium deposit of more than 850 million tonnes of ore. The company is currently working on preparing the SIA and EIA for public consultation. The deposit is situated in South Greenland and is expected to employ approximately 80-100 people in an open-pit all year operation. Mine life is expected to exceed 20 years.

The labour market in Greenland

As society resembles strong aspects of the Scandinavian welfare model, public administration and services dominate the labour market in Greenland (see Table 2.20).

TABLE 2.20 LABOUR MARKET STATISTICS WITH BUSINESS NOMENCLATURE, 2015, IN FULL-TIME EQUIVALENTS.

Source: Statistics Greenland, 2017

Sector	Full-Time Equivalents	%
Public administration and service	10,307	40
Fisheries, catches and agriculture	4,085	16
Trade	2,890	11
Transport	2,445	10
Buildning and construction	1,844	7
Retail services	1,332	5
Other services	914	4
Hotels and restaurants	762	3
Energy and Water supply	380	1
Not known	301	1
Industry	234	1
Mineral extraction	124	0

Greenland is likely to see an increase in industrial production within the next decade. The exploration of both hydrocarbons and minerals may result in new mining projects, and in Maniitsoq there are plans to establish an aluminium smelter.

2.2.9 Waste

The waste sector contributed with 2.9% of the total GHG emissions in 2011, 45% of the total CH_4 emissions and 71% of the total N_2O emissions. Two-thirds of waste from other sectors is produced by households, while the remaining waste is produced in commercial activities.

The Ministry of Nature and Environment under the Greenland Government conducted a study of the composition of both household waste and waste from commercial activities in 2006. From this study the most important waste fraction is organic waste (44%), followed by combustible waste (17.5%), both wet and dry paper and cardboard (18%), glass (7.5%), plastics (7%), metal (3.5%) and environmentally hazardous waste (1.5%).

The composition of waste from commercial activities includes comparatively more paper and cardboard (27%), more plastic waste (9%), more environmentally hazardous waste (3%) and more non-combustible waste (5%), but less glass (3%), metal (3%), organic waste (34%) and other combustible waste (16%).

Today, solid waste management is based on incineration facilities and open landfills (see Table 2.21). In six cities incineration plants are in use, handling approximately 65% of the waste produced in Greenland. Much of the residual heat from the six facilities is used for district heating.

In small towns and settlements, 46 small-scale incineration facilities were established during the period 1995-2003. They incinerate approximately 9% of the waste produced. The small-scale incineration facilities were introduced as an environmentally sound alternative to the use of open landfills. The project cannot be deemed successful and the majority of small-scale incineration facilities are either broken or not in use. In these areas open landfills are still in use. The Greenlandic municipalities have since 2014 worked to clean up 18 landfills in towns and villages. The Ministry of Nature and Environment is also working with the municipalities to carry out projects, where waste is transported from smaller towns to approved waste treatment in bigger towns. Schemes for the recycling of single fractions of waste are established locally, i.e. oil and chemical waste, batteries, electronic waste, glass, hazardous waste, etc. These fractions are shipped to foreign facilities and recycled.

In 2010 the Government of Greenland adopted the Waste Management Plan 2010-2013 which lays down guidelines for the national waste policy.

TABLE 2.21 WASTE MANAGEMENT IN GREENLAND. 1990, 1995, 2000, 2010 AND 2015, IN '000 TONNES. WASTE DISPOSAL IS CORRECTED FOR OPEN BURNING

Source: Statistics Greenland. 2017 (modelbased estimates)

	1990	**1995**	**2000**	**2010**	**2015**
Managed waste disposal corrected for open burning	6.1	6.4	4.9	4.4	4.6
Unmanaged waste disposal corrected for open burning	1.4	1.3	0.9	0.7	0.6
Waste incineration; energy recovery	5.5	6.1	11.3	17.1	18.7
Waste incineration	0.0	0.2	3.1	3.5	3.5
Open burning	16.6	17.2	12.9	11.5	11.5
Total waste produced	**29.5**	**31.2**	**33.1**	**37.2**	**38.9**

Since 1990 Greenland has seen a 28% increase in the amount of waste produced. However, within the same period of time new facilities for waste incineration have increased incineration with energy recovery, while both open burning and disposal has decreased.

There are no waste water treatment plants in Greenland, and waste water produced both on land and at sea is disposed of into the ocean. Households are generally connected to public sewers, but there are still households with no access to sewerage. Industrial waste water management is regulated by Government regulations on environmental operational permits.

2.2.10 Buildings and infrastructure

As of 1 January 2010 there were a total of 23,112 dwellings in Greenland. 83.9% of the housing was available in the 18 towns, while the remaining housing was found in settlements (see Table 2.22).

The public sector plays a very important role in the housing sector. Most housing is owned by the government or built with a government grant. Grants are available for housing built by the owners themselves, cooperative housing, private housing, as well as municipal rental housing. The public sector also subsidises renovation and improvements to private dwellings, e.g. insulation and replacement of windows reducing the energy consumption. A large proportion of the houses are 35 – 40 years old and a refurbishment programme has been initiated. This modernisation includes reducing the energy consumption of individual houses.

TABLE 2.22 HOUSING STATISTICS: DISTRIBUTION OF HOUSING, TOTAL HOUSING, HOUSING SIZE IN M^2 AND ROOMS, AND NEW HOUSING - IN 1997, 2006 AND 2009.

Source: Statistics Greenland, 2013.

	1997	2006	2009
Housing in towns	16,568	18,466	19,402
Housing in settlements	3,376	3,609	3,710
Housing, total[1]	19,940	22,075	23,112
Housing, total in m^2	1,289,681	1,488,342	1,580,752
New housing	94	225	274

[1]Housing excludes dormitories and retirement homes.

2.2.11 Agriculture

Agriculture is scarce in Greenland due to climatic conditions, but agricultural activities are found in South Greenland (see Table 2.23).

Even though Greenland has seen an increase in agriculture, farming and livestock are still small of scale. Since 1990 the area of improved grassland has increased by more than 100%, while the number of farms has seen only small fluctuations.

The average farm is estimated at 18-22 hectares.

TABLE 2.23 CROPLAND, IMPROVED GRASSLAND, MOUNTAINOUS GRASSLAND, IN HECTARES, IN 1990, 2001, 2007, 2012 AND 2017

Source: Statistics Greenland. Agricultural Advisory Service, Ministry of Fisheries, Hunting and Agriculture.

	1990	2001	2007	2012	2017
Cropland	0	5	5	6	0
Improved grassland	490	776	973	1090	1200
Mountainous grassland	242,000	242,000	242,000	242,000	242,000

The mountainous grassland is only used for grazing in the short summer period of 3-4 months for the stock of sheep. The major part of the mountainous grassland is bare rock and mountains.

The agricultural yield i.e. hay produced per hectare, compares to farming in marginal lands in Iceland and northern Scandinavia. However, in order to develop sustainable farming and increase the variety of products, more land must be cultivated.

The increase in improved grassland is a result of the increased demand for fodder for sheep, reindeer, cattle and horses (see Table 2.24).

Further information is available from Agricultural Consulting Services[3].

TABLE 2.24 STOCK OF SHEEP AND REINDEERS IN 1990, 2000, 2008, 2012 AND 2017

Source: Statistics Greenland, Agricultural Advisory Service and Ministry of Fisheries, Hunting and Agriculture.

	1990	2000	2008	2012	2017
Sheep	19,929	20,444	21,080	21,110	17,592
Reindeer (domestic)	6,000	2,000	2,500	2,000	2,200

2.2.12 Forestry

Forestry in Greenland, like agriculture, is found in South Greenland. Coniferous plantations and woods, with trees of an average height more than 5 meters, cover a total area of 54 ha.

There are four forests which may qualify to meet the FAO criteria defining a forest; the largest covering 45 ha with an average height of 6 meters and approx. 100 trees per ha.

Greenland will probably never be truly competitive in the production of commercial timber, but small-scale plantings, e.g. an inland production of Christmas trees for the national market and a small-scale timber production might accompany the agricultural sector in the nearest future.

2.3 THE FAROE ISLANDS

2.3.1 Form of government and structure of administration

The Faroe Islands have home rule status, and their internal affairs are governed by the Faroese parliament (the Lagting). The Faroe Islands are not a member of the EU.

International agreements ratified by the Danish government do not cover the Faroe Islands, unless the Faroese government specifically requests to be a part of the agreement.

Denmark's ratification of the Climate Convention covers the Faroe Islands as well, but at the request of the Faroese government, geographical exemption was taken for the Faroe Islands in connection with Denmark's ratification of the Kyoto Protocol.

2.3.2 Population

In 2017 (1 January) the Faroe Islands had a population of 49,864 - an increase of 11,158 since 1970. In the years 1989-1995 there was a extensive emigration due to a serious deterioration in the economic and employment situation. In 1993 and 1994 alone, net emigration corresponded to 8% of the total population. From 1996 to 2003, the population was growing. But between 2004 to 2013, net immigration has been negative, except in 2008. 1 January 2017, the capital Tórshavn had a population of just over 19,000, representing just over 38% of the population.

2.3.3 Geography

The Faroe Islands consist of 18 small, mountainous islands situated in the North Atlantic at about 62°N and 7°W. The islands extend over 113 km from north to south and 75 km from east to west, and the total land area is 1,399 square kilometres. The highest points, up to 880 metres above sea level, are on the northern islands. 17 of the islands are inhabited.

2.3.4 Climate

The climate in the Faroe Islands is strongly affected by the warm North Atlantic current (the Gulf Stream) and frequent passage of cyclones, which, depending on the location of the polar front, mainly come from southwest and west. The climate is characterised by mild winters and cool summers and the weather is often moist and rainy.

The high pressure over the Azores sometimes shifts towards the Faroe Islands. This can result in stable summer weather lasting several weeks, with relatively high temperatures. In winter, on the other hand, the low pressure systems can move more southerly around the islands than normal, bringing in cold air from the north and a lengthy period of sunny winter weather.

The maritime climate is also a result of the cold east Iceland current (polar current), which splits into two currents from eastern Iceland towards the Faroe Islands. The mixing of the water masses from this and the warm Gulf Stream causes a relatively big difference in the sea temperatures around the islands, and this in turn causes local variations in the climate.

Atmospheric pressure

The normal atmospheric pressure at sea level in Tórshavn is 1008 hPa on an annual basis (1981-2010 level), lowest from October to March (about 1003-1006 hPa) and highest in May and June (about 1014 hPa). The lowest atmospheric pressure recorded was 930.3 hPa on 11 January 1993, and the highest was 1048.9 hPa, recorded on 13 December 1995. The islands have long periods with both low pressure and high pressure.

The Faroe Islands lie close to the normal cyclone paths over the North Atlantic, and big and frequent changes in atmospheric pressure, with rises and falls of 20 hPa within 24 hours are common throughout the year. Sometimes, however, violent cyclones develop and pressure falls by more than 80 hPa/24 hours.

Temperature

The annual mean temperature in Tórshavn is 6.8°C (1981-2010 level; 7.2°C 2006-2015 level). The temperature in January and February is 3.6 to 4°C (1981-2010 level; around 4.3°C 2006-2015 level), and in July and August, from 10.7-11°C (1981-2010 level; from 10.8-11°C 2006-2015 level). The annual mean temperature varies from place to place and is lowest inland on the northern Islands and highest at the coast on the southern Islands (see Figures 2.26 and 2.27).

Temperatures in Tórshavn are higher today than they were in 1873. This increase primarily took place during 1920-1940 and yet again since the 1980's. The period 2001-2010 was the warmest decade since records began and the present temperature level is the highest in the Tórshavn time series. In 2014 there was a record high annual temperature in Tórshavn (8.0°C).

FIGURE 2.26 CLIMATOLOGICAL STANDARD NORMAL FOR TÓRSHAVN 1981-2010

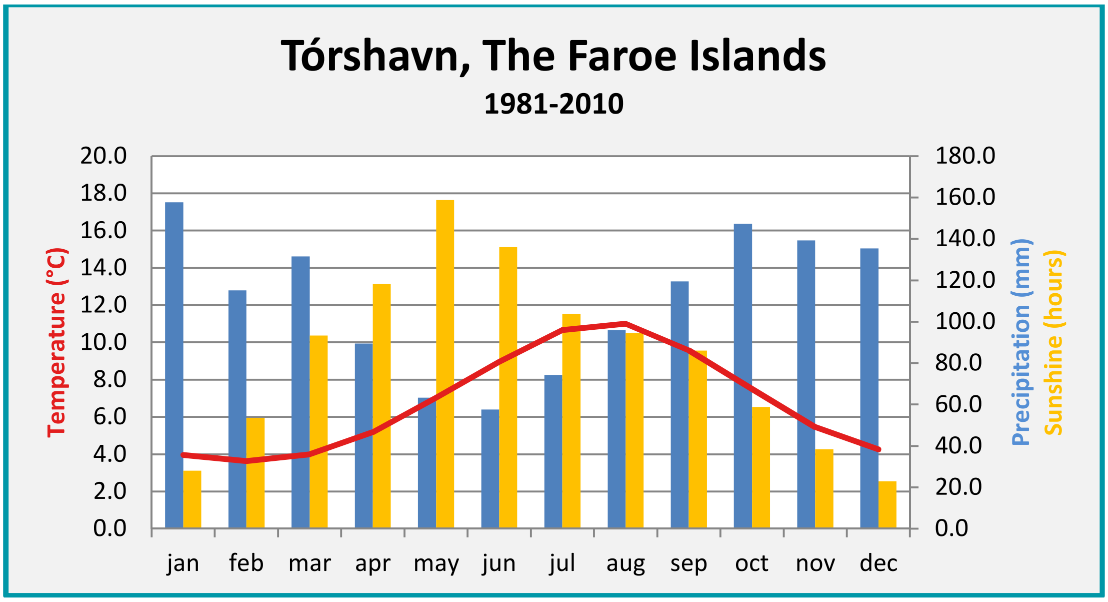
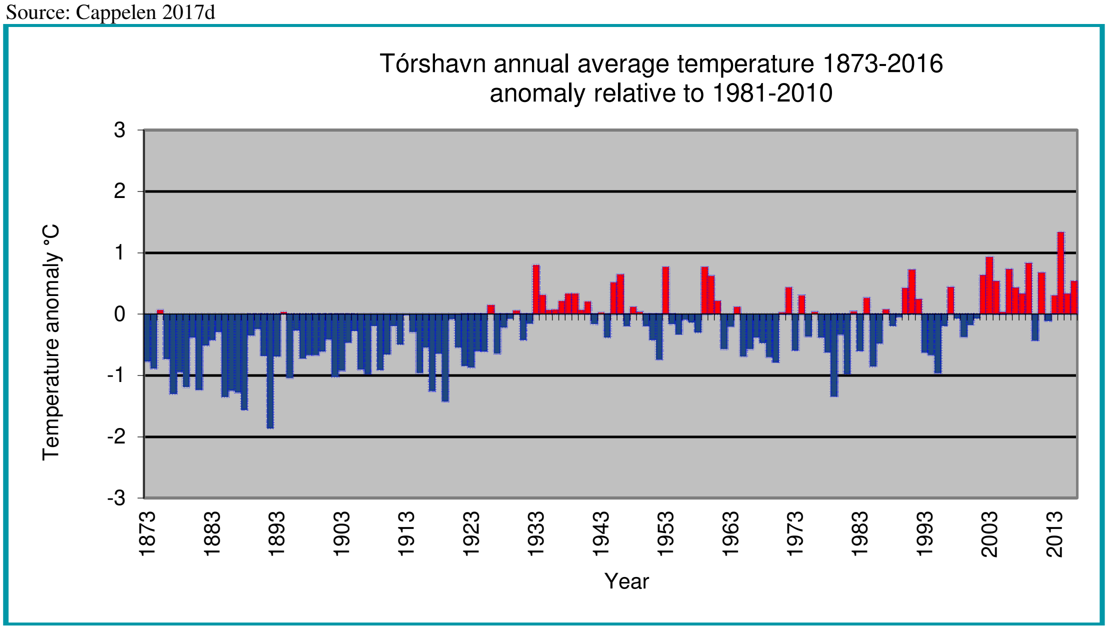


FIGURE 2.27 ANNUAL MEAN TEMPERATURE IN TÓRSHAVN 1873-2016 IN °C, ANOMALY RELATIVE TO 1981-2010
Source: Cappelen 2017d



Precipitation

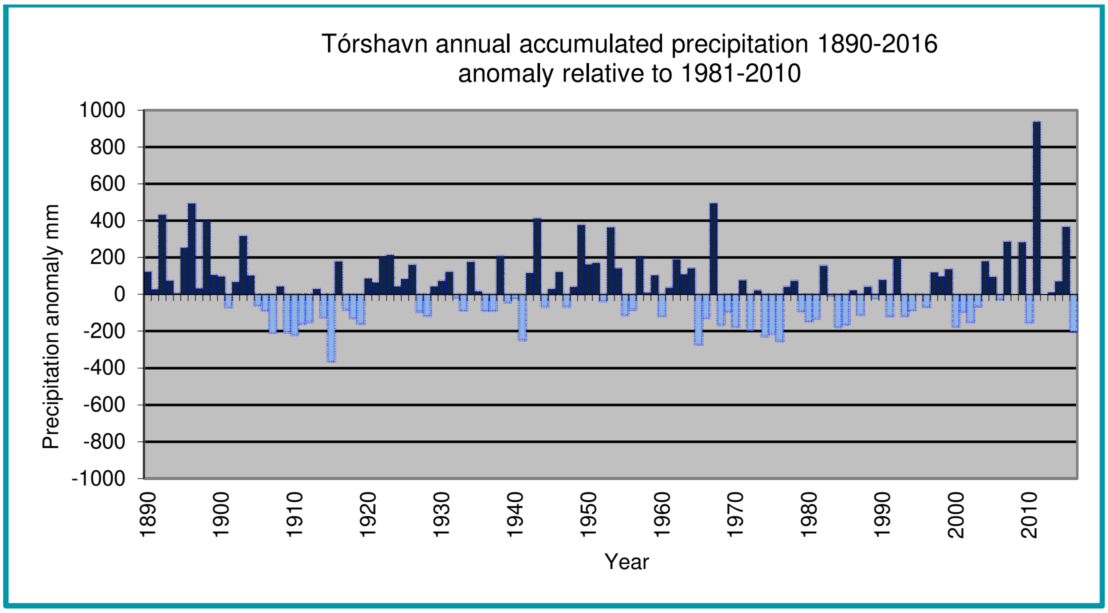
Annual precipitation in Tórshavn is 1,321 mm (1981-2010 level; 1,542 mm 2006-2015 level), most in autumn and winter and least in summer. There are large geographical variations in precipitation, mainly due to the topography of the islands.

The coast on the southern and western islands receive least precipitation and the northern more hilly islands most. Above 3,000 mm has been measured here and it is estimated that more than 4,000 mm can be reached. It rains a lot, indeed and the number of rainy days is high. In the winter, precipitation is often in the form of snow. There is no snow at all in June, July, and August, but there can be snow in September.

Since the mid 1970s, precipitation in Tórshavn has been roughly stable, with an small increasing trend in recent years. See Figures 2.26 and 2.28.

FIGURE 2.28 ANNUAL PRECIPITATION IN TÓRSHAVN 1890-2016 IN MM, ANOMALY RELATIVE TO 1981-2010.

Source: Cappelen 2017d



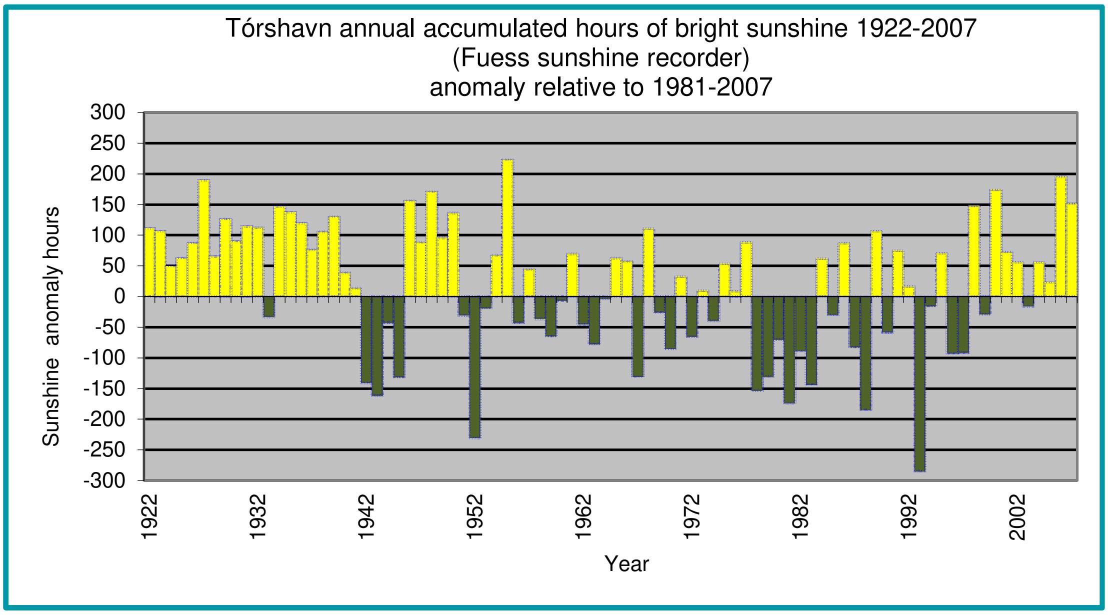
Hours of sunshine

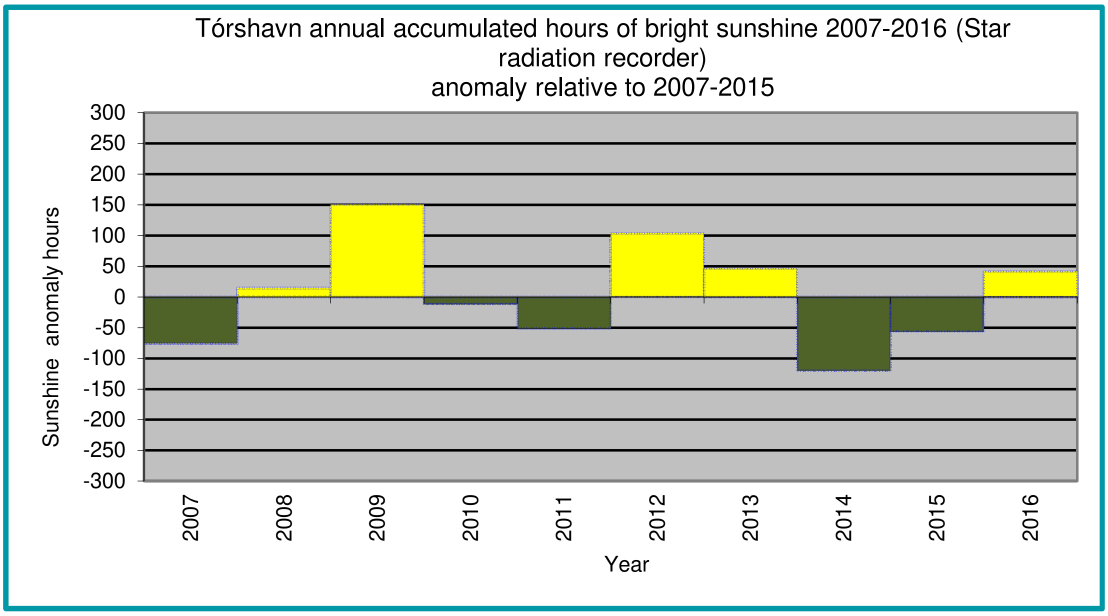
In the period 1981-2007 Tórshavn had 869 hours of sunshine per year (993 hours 2007-2016 level; new instrument see Figure 2.29), most in May and June, the average in the period 2007-2016 being around 147 hours (133 hours 1981-2007 level). In some Decembers there are no hours of sunshine at all. The highest number of hours of sunshine in a calendar month was 232 hours, observed in May 1948 and in May 2000. See Figure 2.29.

The number of hours of sunshine in Tórshavn has remained almost stable during the last 20 years with a slight upward trend seen in the latter part of the period.

FIGURE 2.29 ANNUAL HOURS OF SUNSHINE IN TÓRSHAVN 1922-2007, ANOMALY RELATIVE TO 1981-2010 (TOP) AND 2007-2016, ANOMALY RELATIVE TO 2007-2015 (BOTTOM)

Source: Cappelen 2017d





In the period 1922-2007 the hours of bright sunshine was observed with a traditional Fuess sunshine recorder. Since 2007 the hours of bright sunshine have been calculated using measurements of global radiation from a modern radiation instrument. For that reason "new" and "old" hours of bright sunshine cannot directly be compared; see the two figures.

Wind

The mean wind is generally high in the Faroe Islands, particularly in autumn and winter. The wind is normally lightest in summer. There are normally no storms from April to August, while autumn and winter are windy, with many storms, some of which can reach hurricane force.

The highest 10-minute mean winds are 50 m/s (180 km/h), recorded at Mykines Lighthouse in March 1997 and January 1999. In 1997, gusts of almost 67 m/s (approx. 241 km/h) were recorded at Mykines Lighthouse.

Although the weather is generally windy, there are also still periods, mostly in summer and mostly of short duration.

2.3.5 Economy

The Faroe Islands is a modern, developed society with a standard of living comparable to other Nordic countries. However, the economy is not yet as diversified as in other highly developed countries.

Fishery and related industries are of such importance that their influence determines the overall performance of the Faroese economy. An economy with high dependence on fish products and exporting them is bound to be vulnerable to the changes in catches, fish prices, and exchange rates. These often cyclical and unforeseen changes are volatile, and have left their mark on the economic history of the islands.

The Faroese economy is very sensitive to the international market for fish. Consequently, export income can fluctuate significantly from one year to the next, and these fluctuations spread quickly throughout the economy.

In the aftermath of the financial crisis in 2008, the total employment fell from 25,641 in 2008 to 23,345 in 2011, (approx. 9%). The employment was since stable for a number of years, but has increased from 23,351 in March 2013 to 26,245 in June 2017, which is an increase of 2,230 (approx. 12.4%), which is approximately at the same level as before the financial crisis. Unemployment rose significantly from 3.9% during 2009 and 2010 to 7.5% in February 2011. The unemployment rate (seasonal adjusted) has since been reduced to 2.5% in July 2017. Several large public construction projects are currently ongoing and because of the relatively high construction activity on the Faroes Islands a substantial number of foreign construction workers are now employed by Faroese companies.

The national accounts to 2015 indicate that a proportionally larger output value now comes from production of private and public services (see Table 2.25). The proportional output value from fishery and manufacturing fish products has declined correspondingly. Faroese companies are also actively seeking investment opportunities abroad at a much higher level than in the past. These developments, together with a shift since the mid-1990s towards a more market-oriented economic policy, will most likely contribute to a more diverse and stable economy and this has also most markedly already shown up as growth in international transport services.

TABLE 2.25 GROSS VALUE ADDED (B.1G) 1999 - 2015, BREAKDOWN BY SECTOR
Source: Hagstova Føroya. The sector figures for the years 2014 and 2015 are estimations made by Hagstova Føroya in collarboration with the Economic Council.

Million DKK	1999	2000	2005	2010	2011	2012	2013	2014	2015
Non-financial sector	3,942	4,364	4,994	6,232	6,484	6,716	7,586	8,417	9,143
Financial sector	243	273	306	440	419	424	417	378	342
Public services	1,484	1,602	2,328	3,003	3,040	3,075	3,190	3,282	3,396
Households and NPISH	1,115	1,191	1,315	1,601	1,663	1,728	1,793	1,841	1,890
Total	**6,785**	**7,429**	**8,944**	**11,276**	**11,606**	**11,943**	**12,985**	**13,918**	**14,770**

2.3.6 Energy

The joint municipal company, SEV, is responsible for the production and sale of electricity in the Faroe Islands. In 2016 production amounted to about 315 mill. kWh cf. Table 2.26. Of this, about 33% was based on hydroelectricity, 16% on windpower while the remainder was produced at diesel-driven plants. The windpower has increased 100-fold since year 2000.

Sales of electricity in 2016 were distributed between 38 % primery sector, production and construction, 27% for households and 24% for the service sector, with the remainder for street lighting etc.

TABLE 2.26 ELECTRICITY PRODUCTION 1999-2016 (GWH)

Source: Hagstova Føroya - Statistics Faroe Islands.

	1999	2000	2005	2010	2011	2012	2013	2014	2015	2016
Hydropower	70.2	76.0	99.0	67.4	92.5	99.8	90,6	120,7	133,1	106,3
Diesel power	130.6	136.4	135.6	199.3	166.8	181.0	180,1	150,2	125,5	158,9
Wind power	0.6	0.5	10.3	13.6	14.5	10.8	21,8	34,5	55,8	52,1
Total	**201.4**	**212.9**	**244.9**	**280.8**	**273.8**	**291.6**	**292,5**	**305,4**	**314,4**	**317,4**

Since a number of oil finds in British territorial waters close to the Faroese border in the 1990s, there has been a reasonable presumption that there is oil in Faroese territory, and the first licensing round was held in 2000, the second in 2004, the third in 2008 and the forth is open until 17 February 2018. The first licences for exploration and production of hydrocarbons in the subsoil off the Faroe Islands were granted in August 2000. The first three exploration wells were drilled in 2001. Since then seven wells have been drilled (2003, 2006, 2007/08, 2010, 2012 and two in 2014). So far none of the finds have been commercially viable.

2.3.7 Transport

Goods transport between the Faroe Islands and the rest of the world is mainly by sea. Two shipping companies operate freighter services all year round.

Besides Vágar Floghavn, the Faroe Islands have 12 helicopter pads. Air services are provided by the Faroese company ATLANTIC AIRWAYS and since 2017 also by SAS, but with a relative low frequency. The number of air travellers to and from the Faroe Islands has risen sharply in the last few years.

Passenger transport by sea mainly takes place in the summer period. There are both regular services (Smyril Line) and cruise liners. The number of foreign passenger ships calling at the Faroe Islands has been increasing in recent years.

For 20-30 years up to the beginning of the 1990s and again over the last few years, major investments have been made in enlarging and modernising the transport infrastructure in the islands and the communication links with the outside world. The first undersea tunnel in the Faroe Islands, Vágatunnilin, opened in 2002, connecting Vágoy (airport) with Streymoy (with Tórshavn, capital). In 2006, the second undersea tunnel in the Faroes, Norðoyartunnilin, which joins Borðoy with Eysturoy, opened. Now the third undersea tunnel, which will join Tórshavn with Eysturoy (Runavík and Strendur) is being constructed and is planned to open in 2020. Constructing roads, tunnels, and harbours is costly because of the difficult topographical conditions. Apart from 2009-2014, the number of motor vehicles has been increasing by almost 1,000 per year since 1995 and in 2016 there were 32,800 motor vehicles, of which about 22,200 were cars and 8,700 lorries, vans and buses.

2.3.8 Industry

The sectoral composition of the Faroese economy reveals a relatively large primary sector, brought about by the sizeable fishing fleet and a thriving fish farming industry.

As a result, fish and fish products accounted for 97.5% of the export of goods in 2015 and about 57% of total foreign income stemmed from fish and fish-related industries.

However, during the past several years, employment in the primary sector has been decreasing, 10.6% in 2016 cf. Table 2.27, and this trend shows no signs of abating, hence reinforcing sectoral diversification, which in the long term ought to make the economy less volatile.

TABLE 2.27 DISTRIBUTION OF EMPLOYMENT BY SECTORS, 2016
Source: Hagstova Føroya – Statistics Faroe Islands

	Faroe Islands
Primary sector	10.6%
Secondary sector	19.7%
Tertiary sector	69.7%

2.3.9 Buildings and urban structures

For many years, the Faroese authorities have made every effort to counteract migration from the small or isolated villages and islands, in particular through a major road-building programme and other transport measures. However, population development is generally poorer in these outlying areas than in other parts of the country.

Housing is predominantly single-family houses, most of which are relatively large and of high standard. In recent years some apartment buildings have been built.

2.3.10 Agriculture

Until the end of the nineteenth century, farming was the Faroe Islands' main industry, but this has changed with the economic and industrial development since then, particularly within fisheries. Farming in 2016 accounted for only 0.1% of the Faroe Islands' gross value added at factor cost.

With a view to increasing the self-sufficiency of the Faroe Islands, the government is providing grants for investments in farming.

With about 5% of the land under cultivation, the Faroe Islands can supply just over half of its total demand for lamb and mutton, most of its demand of milk, half of the demand for potatoes, and a small fraction of demand for beef. In 2016 the Faroe Islands had about 1100 dairy cows and about 79,000 sheep.

2.3.11 Forestry

There is no commercial forestry in the Faroe Islands, but there are a number of plantations on the islands, which are maintained by the Faroese forestry authority.

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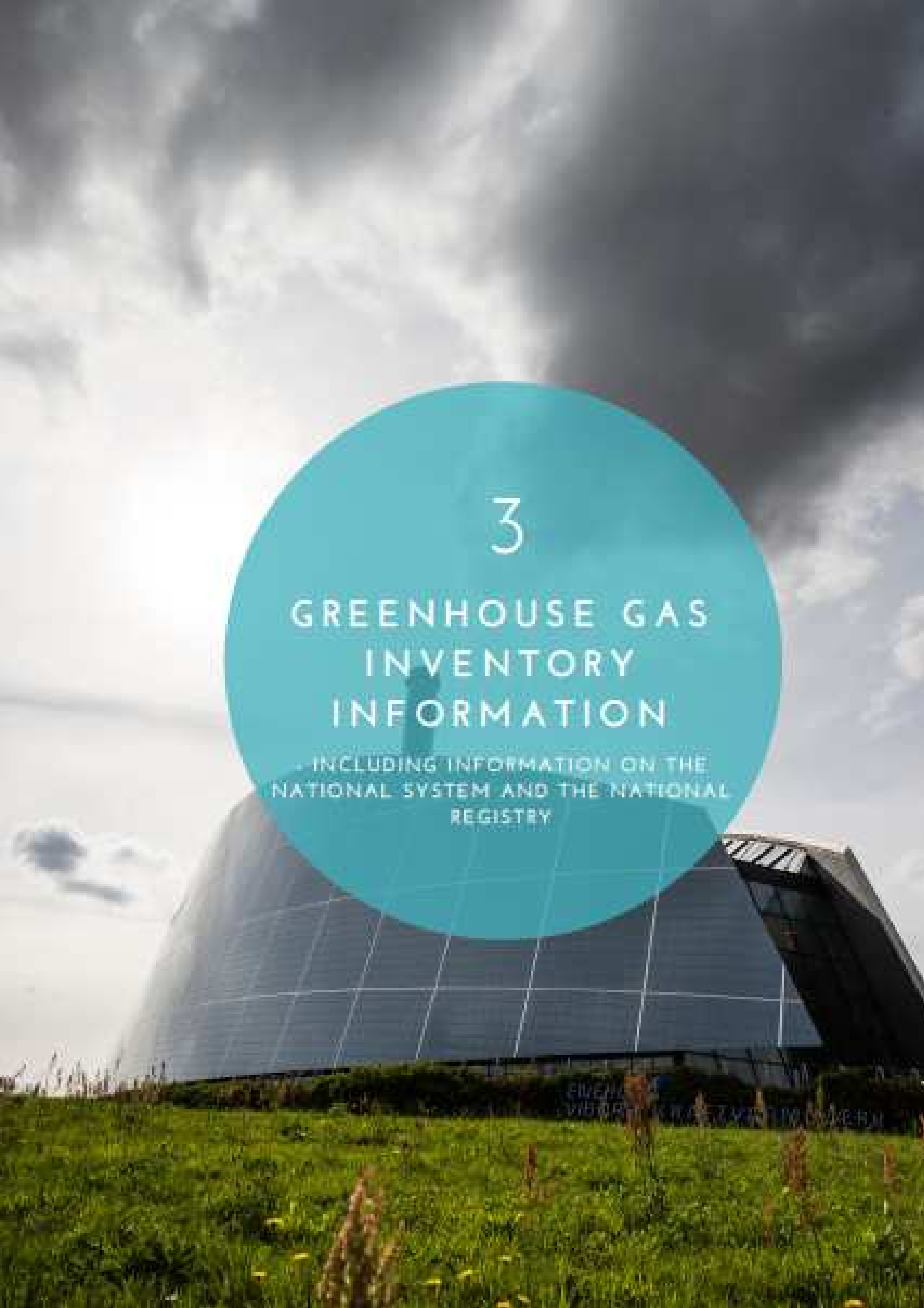
[1] Note: The population base for the firewood survey has been increased and therefore firewood consumption figures before and after 2015 are not fully comparable.

[2] After the submission of NC6 in 2014 the Danish waste statistics have been subject to QA/QC. In the new waste statistics soil and rocks from earth and construction works going to landfills is now treated as waste. Of the total amount of waste treated in 2015, which amount to 11,567,444 tonnes, 2,324,850 tonnes including soil and rocks – or 20.1% - went to landfills. Excluding soil and rocks the amount of waste going to landfills in 2015 was 1.084,409 tonnes or 10.5% of the total amount treated.

[3] http://www.nunalerineq.gl/english/landbrug/index-landbrug.htm



3

GREENHOUSE GAS INVENTORY INFORMATION

- INCLUDING INFORMATION ON THE NATIONAL SYSTEM AND THE NATIONAL REGISTRY

3 Greenhouse gas inventory information

- including on national systems and the national registry

3.1 SUMMARY TABLES OF GREENHOUSE GAS INVENTORIES

Denmark's greenhouse gas inventories are prepared in accordance with the guidelines from the Intergovernmental Panel on Climate Change (IPCC) and are based on the methods developed under the European CORINAIR programme.

The Danish emission inventories follow the methodologies described in the EMEP/EEA guidebook[1] and the IPCC's guidelines[2]. In accordance with the latter guidelines, some of the methodologies and emission factors have been modified so that they better reflect Danish conditions.

A description of methods, emission factors and activity data is given in Denmark's national inventory reports (NIR)[3] to the Climate Convention and the Kyoto Protocol, which also includes data in the common reporting format (CRF). The latest NIR and the latest combined Danish inventory of greenhouse gases and other air pollutants can be seen at Aarhus University's website[4] and in Nielsen et al., 2017.

Greenhouse gas inventories for Greenland and the Faroe Islands are included in the national emission inventory reports to the Climate Convention.

Since the UNFCCC has been ratified on behalf of all three parts of the Realm, the Kyoto Protocol has been ratified on behalf of Denmark and Greenland, and only Denmark is a part of the European Union territory to which the EU agreement on joint fulfilment under Article 4 of the Kyoto Protocol applies, three sets of CRF tables are reported annually. For the second commitment period of the Kyoto Protocol, Greenland does not have a reduction commitment and hence the CRF for Denmark only should be assessed in connection with the Doha amendment. The most aggregated summary tables are shown in this Chapter in Table 3.1 (Denmark, Greenland and the Faroe Islands), Table 3.2 (Denmark), Table 3.3 (Greenland), Table 3.4 (Faroe Islands) and Table 3.6 (Denmark and Greenland) respectively.

CRF summary tables for Denmark with more disaggregated information on Danish source categories are given in Annex A1.

In all summary tables, the base year presented is the base year under the Climate Convention; 1990. Under the UNFCCC, time series of emission inventories, including emissions in 1990, are often recalculated in the annual reporting due to new knowledge regarding emission factors, activity data, methodologies, etc. Under the Kyoto Protocol, the assigned amount for Denmark for the period 2013-2020 was determined in 2017 on the basis of the base year reported in the annual inventory reporting in 2016. The fixed base year and the calculation of the assigned amount under the Kyoto Protocol are further described in section 3.5.

3.2 DESCRIPTIVE SUMMARY OF DENMARK'S EMISSIONS AND REMOVALS OF GREENHOUSE GASES

The total inventories for Denmark, Greenland and the Faroe Islands (the Realm) are given in Table 3.1.

Since the fifth National Communication, full CRF tables have been elaborated for Greenland and the Faroe Islands. This means that three separate CRF tables are created and then the submissions to the Climate Convention and the Kyoto Protocol are aggregated. The process for aggregating the different submissions is described in the NIR (Nielsen et al., 2017). The documentation of the Greenlandic and Faroese inventories has also been greatly expanded and the documentation for Greenland is now presented in a separate chapter in the NIR, while the documentation for the Faroe Islands is included in an annex to the NIR.

Greenland's and the Faroe Islands' greenhouse gas emissions are small compared with those of Denmark (each about 1% of the total emissions), and they have been almost constant since 1990.

The emissions from the Realm (i.e. including emissions from Greenland and Faroe Islands) of the greenhouse gases CO_2 (carbon dioxide), CH_4 (methane), N_2O (nitrous oxide), and the so-called potent greenhouse gases (F-gases), which include HFCs (hydrofluorocarbons), PFCs (perfluorocarbons), SF_6 (sulphur hexafluoride) and NF_3 (nitrogen trifluoride) during the period 1990-2015 are shown in Table 3.1 and Figures 3.1-3.4 aggregated into the IPCC's six main sectors and the most relevant sub-sectors. Total greenhouse gas emissions for the Realm measured in CO_2 equivalents on the basis of the global warming potential of each gas are shown together with the distribution with respect to gas and source/sector in Table 3.2. The development in Danish greenhouse gas emissions from 1990-2015, broken down by source and sink categories from Table 10 of the CRF, is shown in Annex A1.

In the following sections 3.2.1 to 3.2.6, further information on Danish emissions of individual greenhouse gases, indirect greenhouse gases and SO_2 is provided.

Separate summary information on Greenland's and the Faroe Islands' greenhouse gas emissions are shown in section 3.2.7 and section 3.2.8 respectively.

TABLE 3.1 DENMARK'S, GREENLAND'S AND THE FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES, 1990 - 2015

Source: Nielsen et al., 2017.

GREENHOUSE GAS EMISSIONS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	CO_2 equivalent (kt)																									
CO_2 emissions without LULUCF	54883	65468	59636	61715	65731	62688	76019	66628	62413	59860	55629	57308	56890	62049	56514	52940	60858	56095	52614	50172	50689	45618	41035	42972	38779	36449
CO_2 emissions with LULUCF	59739	69683	64582	65916	69635	66825	79360	70457	66422	63928	59775	62210	62890	67661	61783	58111	66414	58922	50606	52326	49814	43117	40698	43962	38837	40509
CH_4 emissions without LULUCF	7663	7852	7930	8124	8016	8090	8204	8095	8150	8055	7946	8184	8111	8117	7942	7709	7613	7597	7466	7321	7384	7222	7094	6987	6983	6884
CH_4 emissions with LULUCF	7682	7872	7951	8147	8041	8117	8233	8125	8182	8088	7981	8221	8150	8157	7985	7752	7658	7644	7515	7372	7435	7275	7152	7046	7040	6944
N_2O emissions without LULUCF	7904	7731	7469	7273	7198	7155	6802	6836	6913	6993	6949	6733	6731	6604	6148	5496	5392	5569	5517	5258	5161	5174	5054	5057	5162	5202
N_2O emissions with LULUCF	7931	7758	7496	7300	7225	7182	6829	6863	6940	7020	6976	6760	6757	6630	6175	5523	5419	5595	5544	5285	5188	5201	5082	5086	5192	5236
HFCs	NO,NE	NO,NE	4	102	146	241	380	378	478	587	711	747	795	830	895	952	978	1010	1015	972	972	909	826	811	736	677
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	0	1	2	5	11	16	23	28	28	25	21	19	21	21	18	20	19	16	12	11	9	5
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	42	61	85	97	117	103	58	70	57	62	56	28	24	30	31	20	34	28	29	34	36	70	112	131	133	103
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	70493	81111	75124	77311	81207	78279	91466	82012	78022	75572	71313	73029	72578	77653	71551	67136	74895	70320	66660	63778	64261	59007	54134	55969	51801	49321
Total (with LULUCF)	75395	85373	80119	81562	85163	82469	94863	85898	82089	79701	75521	77994	78644	83332	76890	72377	80524	73222	64727	66010	63465	56587	53883	57047	51946	53475
Total (without LULUCF, with indirect)	**71710**	**82370**	**76352**	**78517**	**82369**	**79416**	**92590**	**83060**	**79026**	**76510**	**72187**	**73878**	**73390**	**78449**	**72315**	**67871**	**75593**	**70976**	**67288**	**64349**	**64817**	**59511**	**54609**	**56420**	**52222**	**49734**
Total (with LULUCF, with indirect)	76612	86632	81347	82767	86325	83607	95987	86946	83093	80639	76395	78843	79455	84128	77654	73112	81221	73878	65355	66581	64021	57092	54358	57498	52367	53888

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	CO_2 equivalent (kt)																									
1. Energy	53700	64361	58516	60686	64693	61667	75166	65694	61631	59238	54878	56673	56160	61463	55894	52208	60115	55295	52012	49944	50635	45240	40508	42353	38069	35784
2. Industrial processes and product use	2344	2470	2523	2593	2706	2879	3022	3107	3207	3447	3639	3527	3483	3500	3333	2809	2869	2898	2597	2113	2057	2198	2147	2163	2106	2035
3. Agriculture	12668	12493	12317	12266	12111	12116	11698	11708	11720	11352	11265	11263	11340	11084	11021	10826	10562	10787	10731	10444	10363	10365	10311	10315	10436	10335
4. Land use, land-use change and forestry	4902	4262	4995	4251	3956	4190	3397	3886	4067	4129	4208	4965	6065	5679	5339	5241	5629	2902	-1933	2232	-796	-2419	-251	1078	145	4154
5. Waste	1781	1788	1768	1767	1697	1616	1580	1504	1464	1535	1531	1566	1595	1607	1303	1293	1349	1340	1320	1277	1206	1203	1168	1138	1189	1167
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)	75395	85373	80119	81562	85163	82469	94863	85898	82089	79701	75521	77994	78644	83332	76890	72377	80524	73222	64727	66010	63465	56587	53883	57047	51946	53475

3.2.1 Carbon dioxide, CO_2

Most CO_2 emissions come from combustion of coal, oil and natural gas in energy industries, residential properties and in manufacturing industry. Road transport is also a major contributor. Outside the energy sector, the only major CO_2 emissions come from cement production, which accounts for 2-3 % of the annual national total. The transport sector is the only major emitting sector that has shown an increasing trend since 1990. However, in the latest years, CO_2 emissions from the transport sector have stabilised.

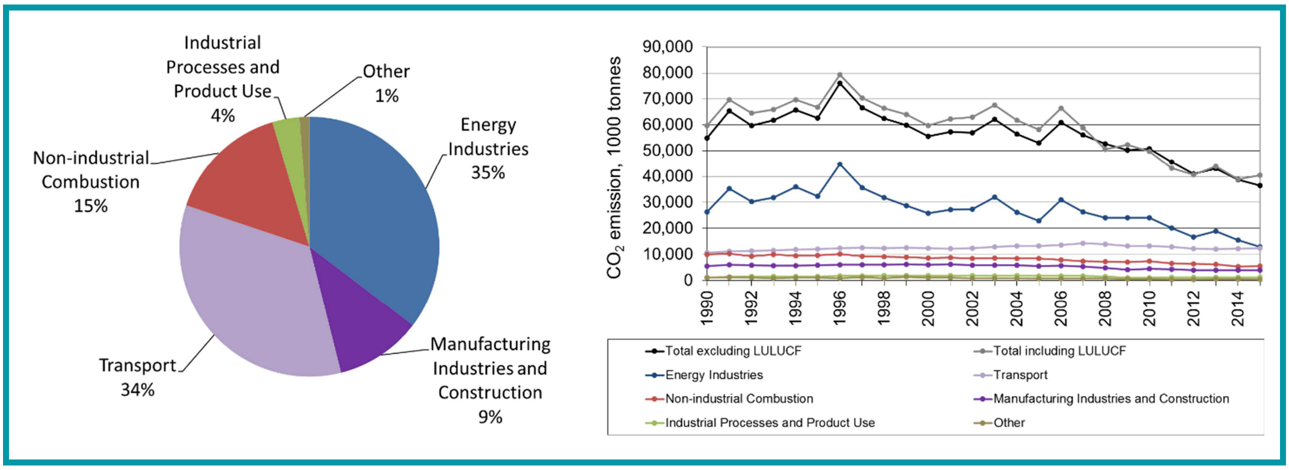
The relatively large fluctuations in the emissions from year to year are due to trade in electricity with other countries - primarily the Nordic countries. The large emissions in 1991, 1994, 1996, 2003 and 2006 are due to large electricity exports.

From 1990 to 1996, emissions showed a rising trend, but they have fallen since 1997 because many power stations have changed their fuel mix from coal to natural gas and biomass. Additionally, the production of renewable energy (mainly wind) has increased significantly. As a result of the reduced use of coal in recent years, most of the CO_2 emissions now come from combustion of oil or oil-based products, both in stationary and mobile sources. Also, there has been a decrease in gross energy consumption, especially since 2006.

In 2015, total actual CO_2 emissions inventoried under the Climate Convention, excluding land-use change and forestry (LULUCF), were about 34 % lower than in 1990. If LULUCF is included, net emissions were about 32 % lower.

FIGURE 3.1: CO_2 EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.



3.2.2 Methane, CH_4

Anthropogenic methane (CH_4) emissions primarily stem from agriculture, landfills, and the energy sector, among which agriculture contributes the most by far.

The emissions from agriculture are due to the formation of methane in the digestive system of farm animals (enteric fermentation) and manure management. Over the time series from 1990 to 2015, the emission of CH_4 from enteric fermentation has decreased by around 9 % due to a decrease in the number of cattle. However, in the same period the emissions from manure management increased by around 20 % due to a change in animal housing systems from traditional systems with solid manure towards slurry-based housing systems.

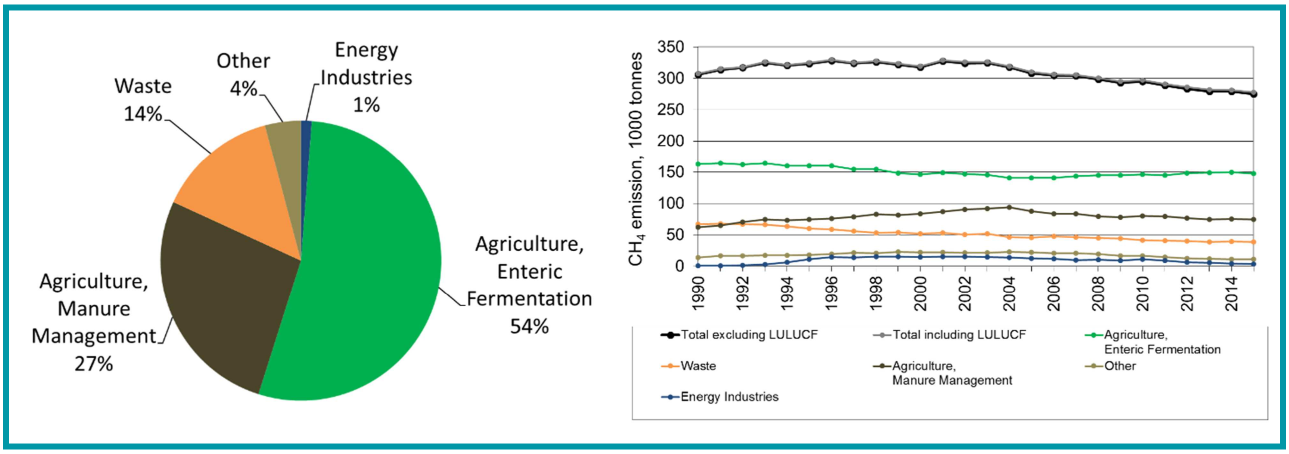
Emissions of methane from landfills are decreasing, because of the ban on landfilling of combustible waste. This has led to a decrease in the amount of landfilled biodegradable waste and hence the emissions. Also, contributing to the decrease in emissions was the increased CH_4 recovery in the early part of the time series. This recovery has decreased in later years due to less CH_4 production in the landfills.

Emissions of methane from the energy sector increased up to 2003 due to increased use of gas-driven engines, which emit large amounts of methane compared to other combustion technologies. However in later year's new legislation establishing emission limits for existing gas-driven engines came into force pursuant to Statutory Order No. 720 of 5 October 1998, and combined with decreased use of gas engines, this has resulted in lower emissions.

In 2015, total CH_4 emissions were 10 % below the 1990 level.

FIGURE 3.2 CH_4 EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.



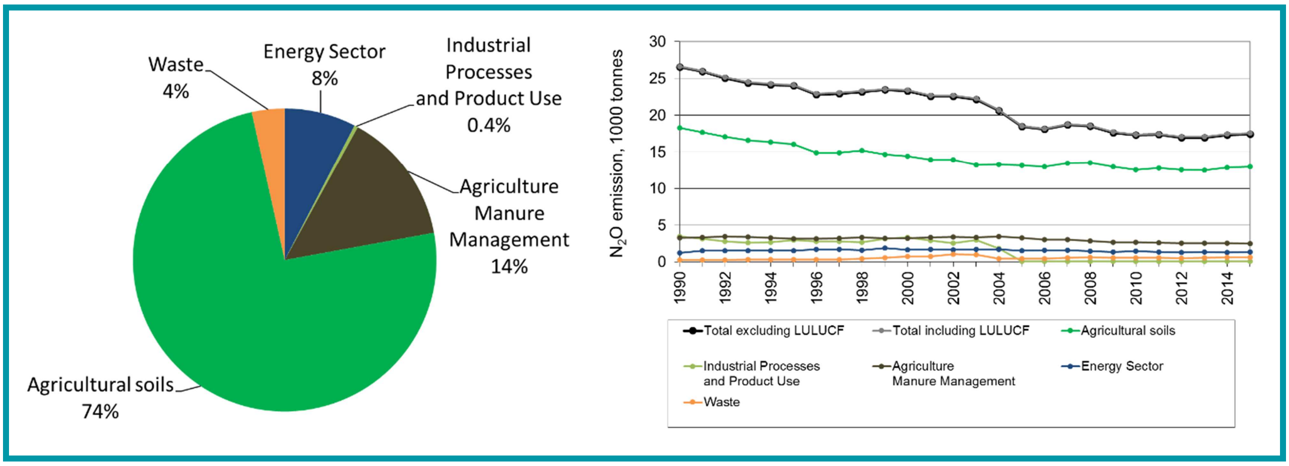
3.2.3 Nitrous oxide, N_2O

Agriculture constitutes the largest source by far of nitrous oxide (N_2O) emissions, since N_2O can be formed in the ground, where bacteria convert nitrous compounds from fertiliser and manure. Bacterial conversion of nitrogen also occurs in drain water and coastal water due to leaching and run off. This nitrogen largely comes from agriculture's use of fertiliser, and emissions from these sources are therefore included under agriculture. From 1990, N_2O emissions from agriculture have decreased by 28 % due to legislation to improve the utilisation of nitrogen in manure. The legislation has resulted in less nitrogen excreted per unit of livestock produced and a considerable reduction in the use of nitrogen fertilisers. The basis for the N_2O emission is then reduced. A small share of the nitrous oxide emissions originates from power and district heating plants, and cars with catalytic converters. Previously, a plant producing nitric acid was in operation in Denmark. However, this plant shut down in 2004, eliminating N_2O emissions from this activity.

In 2015, total N_2O were 34 % below the 1990 level.

FIGURE 3.3 N_2O EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.



3.2.4 The f-gases: HFCs, PFCs, and SF_6

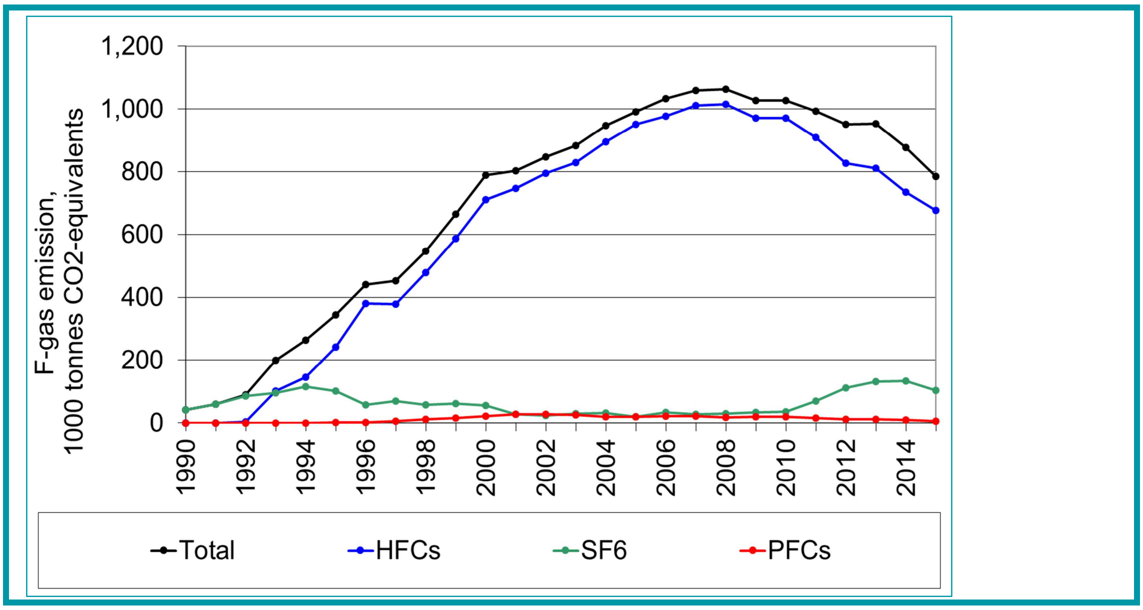
The contribution of f-gases (HFCs, PFCs, SF_6 and NF_3), to Denmark's total emissions of greenhouse gases is relatively modest. However, the emissions of these gases increased significantly during the 1990s. Collection of data on the consumption of these substances started in the mid-1990s. Therefore, f-gas data and emissions inventories from before 1995 are less certain than in 1995 and later. In accordance with the Kyoto Protocol, Denmark has selected 1995 as the base year for the f-gases. There is no consumption of NF_3 in Denmark at any point during the time-series.

The HFCs, which are primarily used in refrigeration and air conditioning, are the biggest contributor to f-gas emissions. From 1995 to 2015 annual emissions of HFCs increased from 241 to 677 kt of CO_2 equivalents. However, emissions of HFCs peaked at 1015 kt of CO_2 equivalents in 2008. Emissions of PFCs increased in the same period from 0.6 to 4.9 kt of CO_2 equivalents, the emissions of PFCs peaked in 2002 at 28.0 kt of CO_2 equivalents. The emissions of SF_6 were at the same level in 1995 and in 2015 at103 kt of CO_2 equivalents. Emissions of SF_6 is peaking in the later years as double glazed windows using SF_6 in the early 1990'ties are currently being decommissioned. The emission peak in 2014 was at 133 kt of CO_2 equivalents.

The total emissions of HFCs, PFCs and SF_6 increased by 128 % from 1995 to 2015.

FIGURE 3.4 DEVELOPMENT IN HFC, PFC, AND SF_6 EMISSIONS IN 1990-2015

Source: Nielsen et al., 2017.



3.2.5 Total Danish emissions and removals of greenhouse gases

Table 3.2 and figures 3.5 and 3.6 show the development in the Danish greenhouse gas emissions and removals as CO_2 equivalents and by gases and sources according to the reporting guidelines under the Climate Convention (i.e. without Greenland and the Faroe Islands). CO_2 is the most important greenhouse gas, followed by N_2O and CH_4. As mentioned previously, emissions fluctuate in line with trade in electricity. To illustrate this, the emissions in 1996 (excl. LULUCF) were estimated to 90 248 kt of CO_2 equivalents, whereas the total greenhouse gas emissions in 2003 were estimated to 76 151 kt of CO_2 equivalents (excl. LULUCF). In 2015 the total emissions were estimated to 47 919 kt of CO_2 equivalents,

Of the total Danish greenhouse gas emissions in 2015, CO_2 made up 73.3%, methane 14.3%, nitrous oxide 10.8%, and f-gases 1.5%. If CO_2 emissions by sources and removals by sinks from forests and soils are included (i.e. with LULUCF), then net total Danish greenhouse gas emissions corresponded to 52 072 kt of CO_2 equivalents in 2015.

As mentioned, the emissions from Greenland (cf. section 3.2.7) and the Faroe Islands (cf. section 3.2.8) only contribute with a very small share to the total emissions; hence the trends as described in sections 3.2.1-3.2.4 are basically the trends in the emissions from Denmark. Therefore the discussion is not repeated in this section. The discussion of emissions of precursor gases, i.e. NO_x, NMVOC, CO and SO_2, is included in this section because the inventory of these gases is not complete for the Realm.

FIGURE 3.5 DANISH GREENHOUSE GAS EMISSIONS BY TYPE OF GAS, DISTRIBUTION IN 2015 AND TIME SERIES 1990 - 2015.

Source: Nielsen et al., 2017.

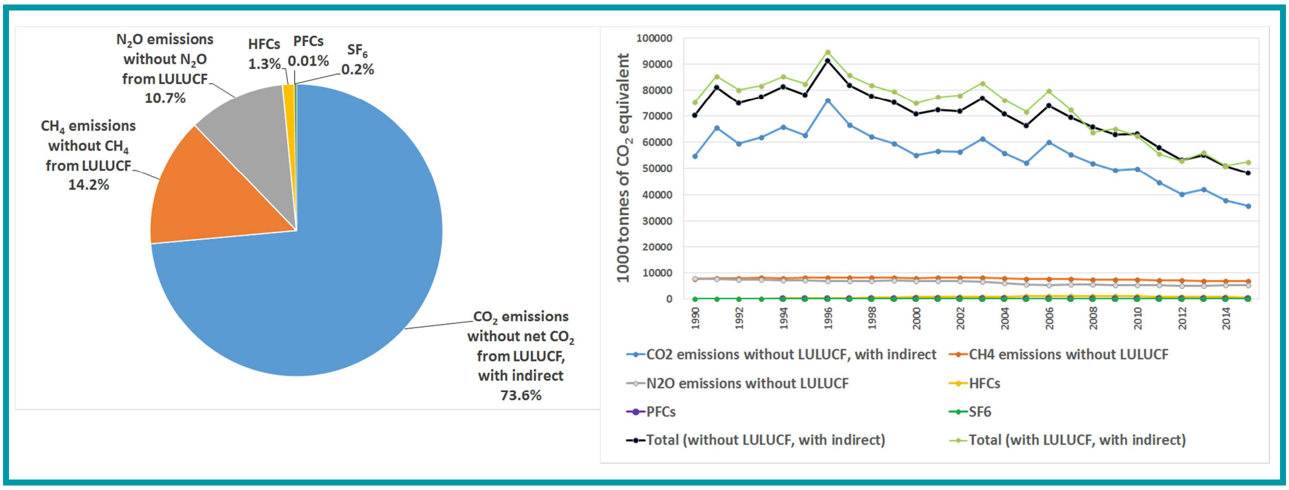


FIGURE 3.6 DANISH GREENHOUSE GAS EMISSIONS IN CO_2 EQUIVALENTS DISTRIBUTED ON MAIN SECTORS FOR 2015 (EXCLUDING LULUCF, WITH INDIRECT CO_2) AND TIME SERIES FOR 1990 TO 2015.

Source: Nielsen et al., 2017.

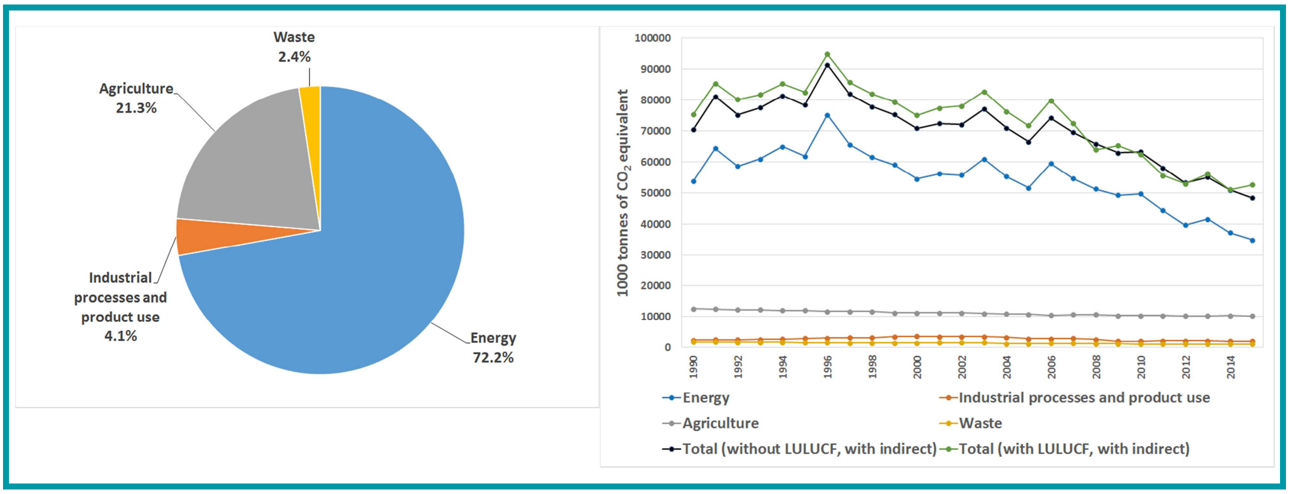


TABLE 3.2 DANISH GREENHOUSE GAS EMISSIONS AND REMOVALS BY GAS AND SOURCE AND SINK CATEGORIES IN 1990 - 2015

Source: Nielsen et al., 2017.

GREENHOUSE GAS EMISSIONS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	CO_2 equivalent (kt)																									
CO_2 emissions without LULUCF	53591	64210	58402	60641	64701	61615	74863	65455	61217	58637	54296	55870	55542	60625	55100	51522	59428	54644	51204	48815	49170	44170	39648	41632	37449	35147
CO_2 emissions with LULUCF	58447	68424	63348	64841	68605	65751	78203	69283	65225	62704	58442	60771	61542	66237	60368	56691	64983	57471	49194	50969	48295	41668	39311	42622	37506	39205
CH_4 emissions without LULUCF	7624	7814	7892	8087	7977	8051	8165	8055	8111	8016	7907	8146	8074	8080	7905	7671	7576	7560	7429	7285	7347	7185	7057	6951	6947	6849
CH_4 emissions with LULUCF	7643	7834	7914	8111	8002	8078	8194	8085	8143	8050	7943	8183	8112	8120	7947	7715	7621	7607	7478	7336	7399	7239	7115	7010	7004	6909
N_2O emissions without LULUCF	7882	7709	7448	7252	7177	7134	6780	6814	6890	6970	6926	6710	6707	6580	6124	5472	5368	5545	5493	5236	5139	5151	5032	5036	5141	5182
N_2O emissions with LULUCF	7909	7736	7475	7279	7204	7161	6807	6841	6917	6997	6953	6736	6734	6607	6151	5499	5395	5571	5519	5262	5166	5179	5060	5065	5170	5216
HFCs	NO,NA	NO,NA	4	102	146	241	380	376	475	582	704	736	780	812	875	933	958	989	993	951	950	886	801	781	702	634
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	0	1	2	5	11	16	23	28	28	25	21	19	21	21	18	20	19	16	12	11	9	5
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	42	61	85	97	116	102	58	70	57	62	56	28	23	30	31	20	33	28	29	34	36	69	112	131	132	103
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	69139	79793	73831	76179	80118	77145	90248	80776	76762	74283	69912	71517	71154	76151	70055	65636	73383	68787	65167	62341	62661	57478	52663	54542	50380	47919
Total (with LULUCF)	74042	84055	78826	80430	84074	81334	93644	84661	80828	78411	74120	76482	77219	81829	75393	70876	79012	71688	63233	64572	61864	55057	52411	55619	50524	52072
Total (without LULUCF, with indirect)	**70356**	**81052**	**75059**	**77385**	**81280**	**78282**	**91372**	**81824**	**77766**	**75220**	**70786**	**72366**	**71965**	**76947**	**70819**	**66371**	**74081**	**69444**	**65795**	**62911**	**63217**	**57982**	**53138**	**54993**	**50801**	**48331**
Total (with LULUCF, with indirect)	75259	85314	80054	81635	85236	82472	94768	85709	81832	79348	74994	77331	78031	82625	76158	71611	79709	72345	63861	65143	62420	55561	52886	56070	50945	52484

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	CO_2 equivalent (kt)																									
1. Energy	52402	63097	57276	59607	63659	60589	74004	64516	60430	58010	53540	55229	54806	60034	54474	50784	58678	53838	50597	48582	49111	43787	39116	41008	36734	34476
2. Industrial processes and product use	2343	2470	2522	2592	2706	2878	3022	3105	3204	3442	3631	3515	3468	3482	3312	2789	2848	2877	2575	2092	2034	2175	2121	2132	2071	1992
3. Agriculture	12631	12457	12281	12232	12075	12079	11660	11669	11682	11314	11228	11225	11303	11046	10983	10788	10525	10750	10694	10407	10326	10328	10274	10278	10400	10299
4. Land use, land-use change and forestry(5)	4902	4262	4995	4250	3956	4190	3396	3885	4067	4128	4208	4965	6065	5678	5338	5240	5628	2901	-1934	2232	-797	-2421	-252	1077	144	4153
5. Waste	1763	1770	1750	1749	1679	1598	1562	1485	1445	1516	1513	1548	1577	1589	1286	1276	1332	1322	1302	1260	1190	1187	1152	1123	1175	1153
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)(5)	74042	84055	78826	80430	84074	81334	93644	84661	80828	78411	74120	76482	77219	81829	75393	70876	79012	71688	63233	64572	61864	55057	52411	55619	50524	52072

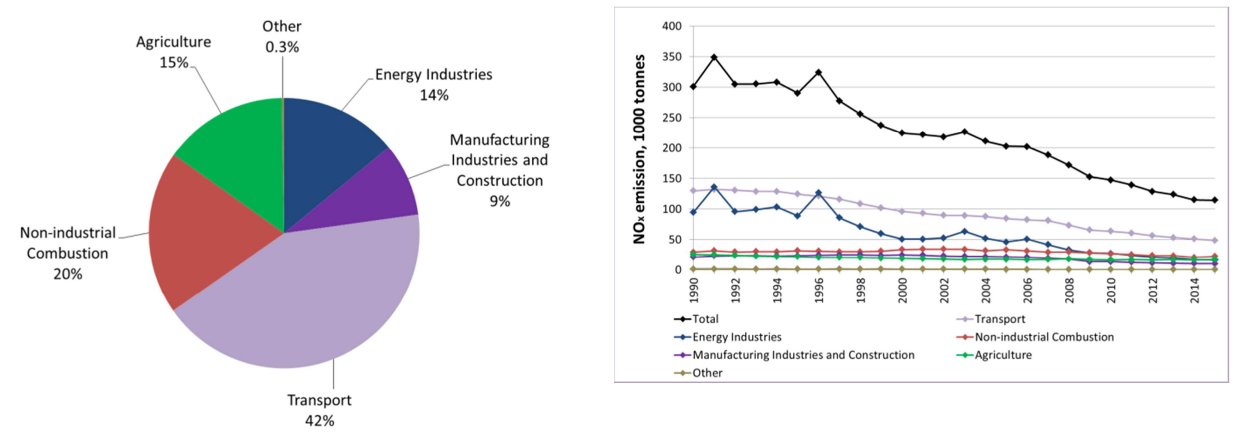
3.2.6 Danish emissions of indirect greenhouse gases and SO_2

NO_X

The three largest sources of emissions of nitrogen oxide (NO_x) are transport, non-industrial combustion (e.g. other mobile sources such as fishing vessels and agricultural vehicles) and energy industries. In 2015, the transport sector contributed 42% of total Danish NO_x emissions, which had fallen from 130 kt in 1990 to 49 kt in 2015 – a fall of 62%. The increased use of low-NO_x burners and de-NO_x units at power and district heating plants has reduced emissions from these plants. In addition, the increased number of cars fitted with catalytic converters has contributed to the trend in reductions.

FIGURE 3.7: NO_X EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.

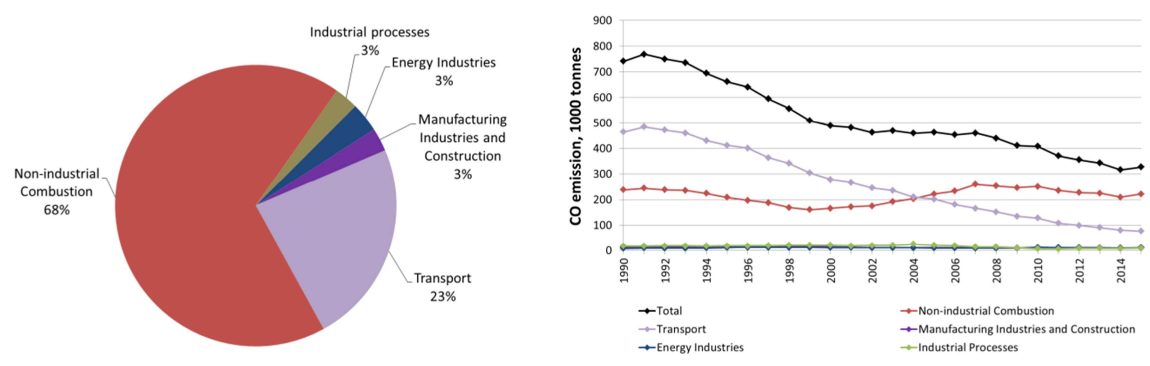


CO

Non-industrial combustion, mainly residential wood combustion and non-road machinery, accounts for more than two thirds of the CO emission. Road transport still accounts a large part of the CO emissions, but the CO emissions from this source has decreased significantly, due to the introduction of catalytic converters for vehicles in 1990. Emissions of CO were reduced by 56% from 1990 to 2015.

FIGURE 3.8: CO EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.

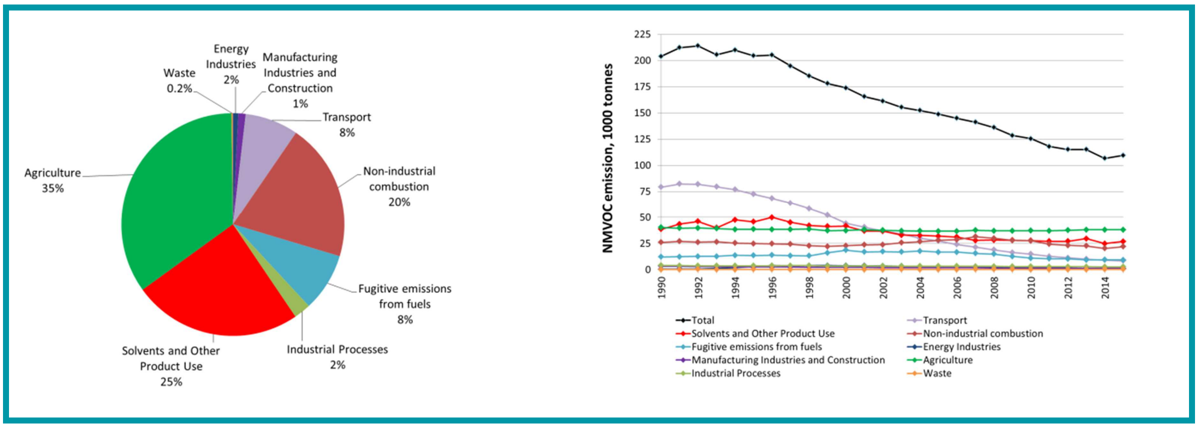


NMVOC

The most significant emission sources of NMVOC are agriculture, use of solvents and other mobile sources. Total anthropogenic emissions of NMVOC were reduced by 46% from 1990 to 2015 – especially due to the increased number of cars fitted with catalytic converters and reduced emissions in connection with use of organic solvents.

FIGURE 3.9: NMVOC EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.

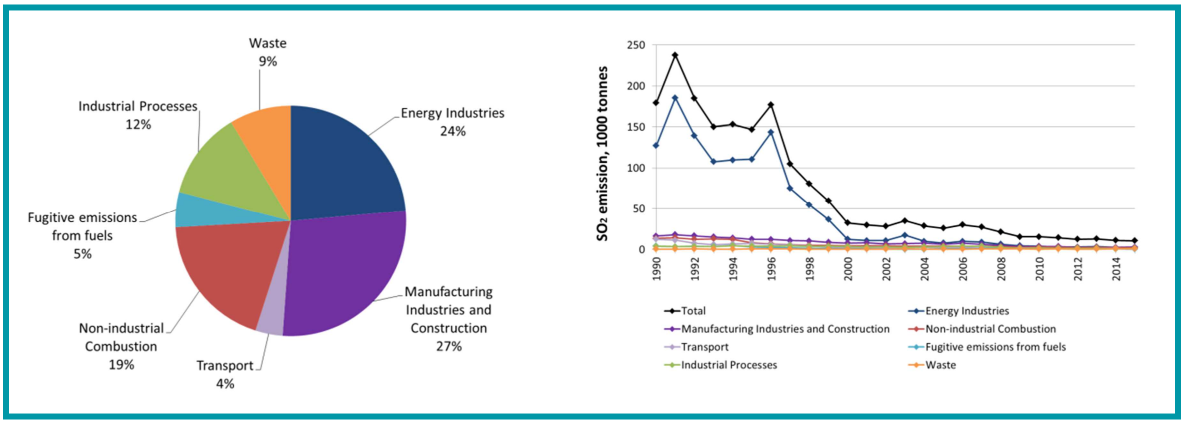


SO_2

The greater part of all SO_2 emissions comes from combustion of coal and oil at power plants, district heating plants and manufacturing plants. Emissions of SO_2 have undergone a remarkable development - from 1990 to 2015 total emissions fell by 94%. The reason for this is primarily the installation of desulphurisation units at the large power plants as well as the use of fuels with low sulphur content for power stations, industry and the transport sector.

FIGURE 3.10: SO_2 EMISSIONS BY SECTOR (2015) AND DEVELOPMENT IN 1990-2015

Source: Nielsen et al., 2017.



3.2.7 Greenland's emissions and removals of greenhouse gases

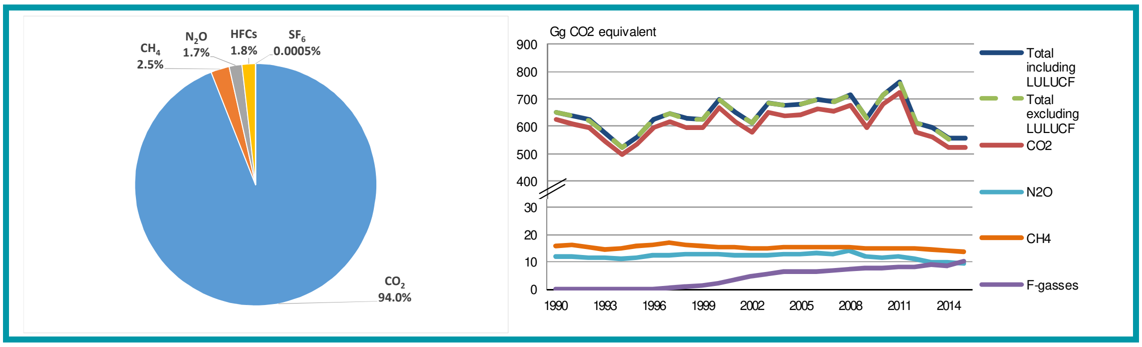
3.2.7.1 Summary information from Greenland's greenhouse gas inventory

In 2015, the total emission of greenhouse gases excluding LULUCF was 557 kt CO_2 equivalent, and 558 kt CO_2 equivalent including LULUCF.

Figure 3.11 shows the total greenhouse gas emissions in CO_2 equivalents from 1990 to 2015. The emissions have not been corrected for temperature variations. CO_2 is the most important greenhouse gas. In 2015, CO_2 contributed to the total emission in CO_2 equivalent excluding LULUCF with 94.0 %, followed by CH_4 with 2.5 %, N_2O with 1.7 % and F-gases (HFCs and SF_6) with 1.8 %. Since 1990, these percentages have been increasing for F-gases, and falling for CO_2 and N_2O, and stable for and CH_4. Greenland has no consumption of PFC.

FIGURE 3.11 GREENHOUSE GAS EMISSIONS BY TYPE OF GAS IN CO_2 EQUIVALENTS, DISTRIBUTION IN 2015 AND TIME SERIES 1990 - 2015.

Source: Greenland's Ministry of Labour, Trade, Industry and Energy, 2017.

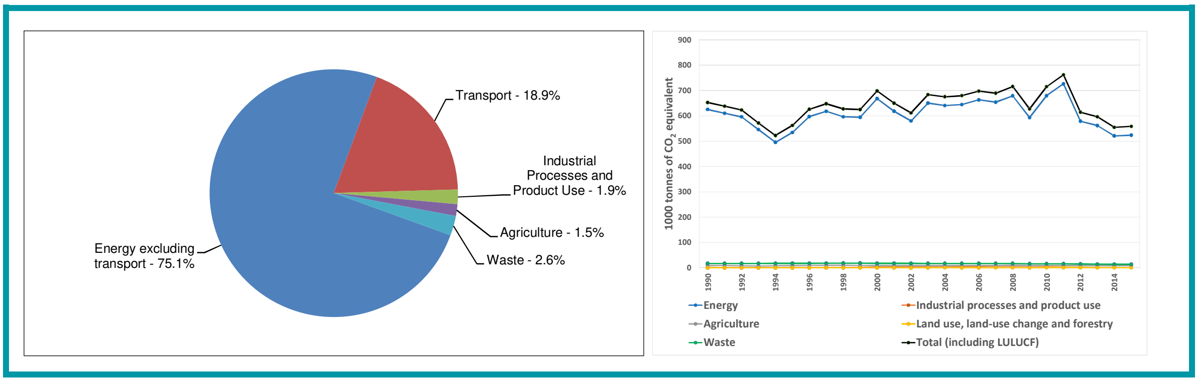


Stationary combustion plants and transport represent the largest categories. In 2015, energy excluding transport accounted for 75.1 % of the total emission in CO_2 equivalents excluding LULUCF; see Figure 3.12. Transport contributed with 18.9 %. Industrial processes and product use, agriculture and waste contributed to the total emission in CO_2 equivalents with 6.0 %.

The net CO_2 emission from forestry etc. was 0.2 % of the total emission in CO_2 equivalents in 2015. Total GHG emissions in CO_2 equivalents excluding LULUCF have decreased by 14.6 % from 1990 to 2015 and decreased 14.4% including LULUCF.

FIGURE 3.12 GREENLAND'S GREENHOUSE GAS EMISSIONS IN CO_2 EQUIVALENTS, SOURCE/SECTOR – DISTRIBUTION IN 2015 AND TIME SERIES 1990 – 2015

Source: Greenland's Ministry of Labour, Trade, Industry and Energy, 2017.



3.2.7.2 *Summary information on Greenland's national inventory arrangements*

Greenland's national inventory is compiled by Statistics Greenland and then submitted to DCE (Danish Centre for Environment and Energy). DCE reports to the UNFCCC on behalf of the Danish Realm.

TABLE 3.3 GREENLAND'S GREENHOUSE GAS EMISSIONS AND REMOVALS BY GAS AND SOURCE AND SINK CATEGORIES IN 1990 - 2015

Source: Nielsen et al., 2017.

GREENHOUSE GAS EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalent (kt)																									
CO_2 emissions without LULUCF	624	624	610	596	546	496	534	597	618	597	595	667	618	580	650	640	644	662	653	678	593	679	725	579	561	521
CO_2 emissions with LULUCF	625	625	610	596	546	496	535	597	618	597	595	668	619	580	651	641	645	663	654	679	593	680	727	580	562	522
CH_4 emissions without LULUCF	16	16	16	15	15	15	16	16	17	16	16	15	15	15	15	15	16	15	15	15	15	15	15	15	15	14
CH_4 emissions with LULUCF	16	16	16	15	15	15	16	16	17	16	16	15	15	15	15	15	16	15	15	15	15	15	15	15	15	14
N_2O emissions without LULUCF	12	12	12	12	11	11	12	12	12	13	13	13	13	12	13	13	13	13	13	14	12	12	12	11	10	10
N_2O emissions with LULUCF	12	12	12	12	11	11	12	12	12	13	13	13	13	12	13	13	13	13	13	14	12	12	12	11	10	10
HFCs	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	1	1	2	3	5	6	6	6	6	7	7	8	8	8	8	9	9
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	652	652	638	623	572	522	562	626	647	627	624	698	649	612	683	674	679	697	688	715	627	714	761	613	595	553
Total (with LULUCF)	653	653	638	623	572	523	562	626	648	627	625	698	650	612	684	675	680	698	689	716	627	715	762	614	596	555
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalent (kt)																									
1. Energy	625	625	610	596	546	496	534	597	618	597	594	668	618	580	650	641	645	663	654	679	593	680	726	579	562	521
2. Industrial processes and product use	0	0	0	0	0	0	0	0	1	1	2	2	4	5	6	7	7	7	7	8	8	8	9	9	9	9
3. Agriculture	10	10	10	9	8	8	9	10	10	10	10	9	9	9	9	10	10	10	10	10	9	10	10	9	9	9
4. Land use, land-use change and forestry[(5)]	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1
5. Waste	17	17	18	18	18	18	18	18	19	19	19	18	18	18	18	18	18	18	18	18	16	16	16	16	15	15
6. Other																										
Total (including LULUCF)[(5)]	653	653	638	623	572	523	562	626	648	627	625	698	650	612	684	675	680	698	689	716	627	715	762	614	596	555

3.2.8 The Faroe Islands' emissions and removals of greenhouse gases

3.2.8.1 Summary information from Faroe Islands' greenhouse gas inventory

Table 3.4 and figures 3.13 and 3.14 show the development in the Faroe Islands' greenhouse gas emissions and removals as CO_2 equivalents and by sources and gases according to the reporting guidelines under the Climate Convention (i.e. the Faroe Islands' contribution to the total of the Realm).

As shown in Figure 3.13 the development in total greenhouse gas emissions in CO_2 equivalents has increased by 20.4 % from 1990 to 2015. The total Faroese greenhouse gas emissions corresponded to 868 kt of CO2 equivalents in 2015.

As also shown in Figure 3.13 the main part - i.e. 93 % - of the emissions were from the fuel consumption including waste incineration in the energy sector in 2015. Almost 4 % were from Industrial processes and Product Use and a just above 3 % from Agriculture. The fluctuations in the GHG emissions in the Energy sector are decisive for the fluctuations in the total GHG emissions. The emissions from the Agriculture sector and from Industrial processes and Product Use are relative small and constant.

Figure 3.14 shows that CO_2 is the most important greenhouse gas, followed by F-gases, CH_4 and N_2O. Of the total Faroese greenhouse gas emissions in 2015, CO_2 made up 92.2%, F-gases (HFCs and SF_6) 3.9%, methane 2.6% and nitrous oxide 1.3%.

From 1990 to 1993, a decrease in total Faroese greenhouse gas emissions is observed, due to an economic crisis in the Faroe Islands, which lasted for 6-8 years. From 2001 to 2007, the emissions were rather stabile. In 2008-2011 the emissions from Faroese fishing vessels were – except for 2010 – significantly lower than previous years, especially due to rising oil prices and lower prices on fish. The decrease is concealed by emissions related to new bunkering activity starting in 2009 that has led to a substantial increase in the number of foreign fishing vessels bunkering in the Faroe Islands. In 2015, the total emissions were 20 % above 1990, the base year.

FIGURE 3.13 GREENHOUSE GAS EMISSIONS BY SECTOR FOR 2015 AND DEVELOPMENT 1990 TO 2015

Source: Nielsen et al. (2017).

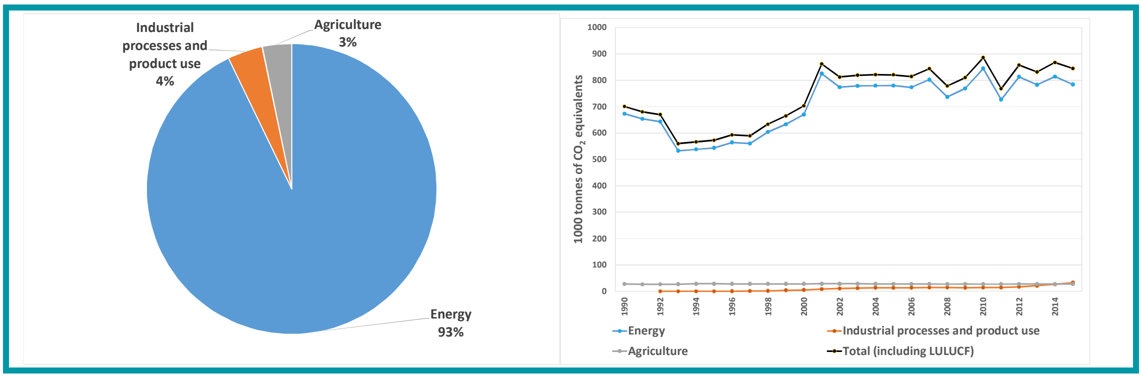
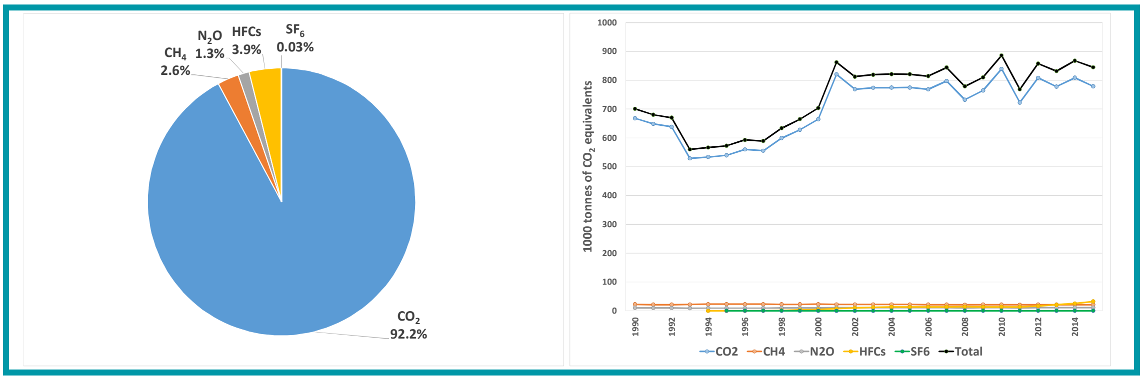


FIGURE 3.14 EMISSIONS OF GHG BY GAS IN 2015 AND DEVELOPMENT 1990 TO 2015.

Source: Nielsen et al. (2017).



Carbon dioxide, CO_2

The emission of CO_2 in the Faroe Islands is from fuel consumption (incl. waste incineration). The trend in the total emission of CO_2 (Figure 3.15) is nearly identical with the trend of the total emission of GHG in the Faroe Islands (Figure 3.14) showing the trends in CO_2 emissions in the period from 1990 to 2015. After the economic decline in the 1990s, the emissions rose and were rather constant until 2007. From 2008 to 2013, the effort in the Faroese fishing fleet was significantly lower than previous years, also meaning a significant reduction in oil consumption. The reduction in the emissions for fisheries in 2009 and 2011 is not visible because a new oil bunkering activity (mostly used by foreign fishing vessels) started up in 2009, increasing the emissions.

FIGURE 3.15 TOTAL CO2 EMISSIONS BY SECTOR FOR 2015 AND DEVELOPMENT 1990 TO 2015

Source: Nielsen et al. (2017).

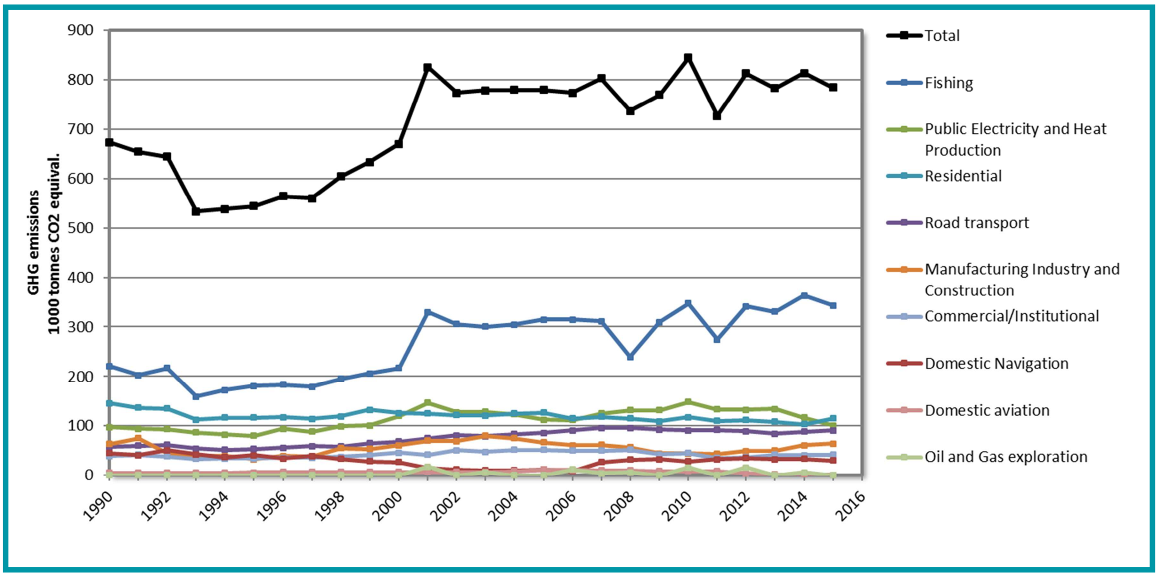
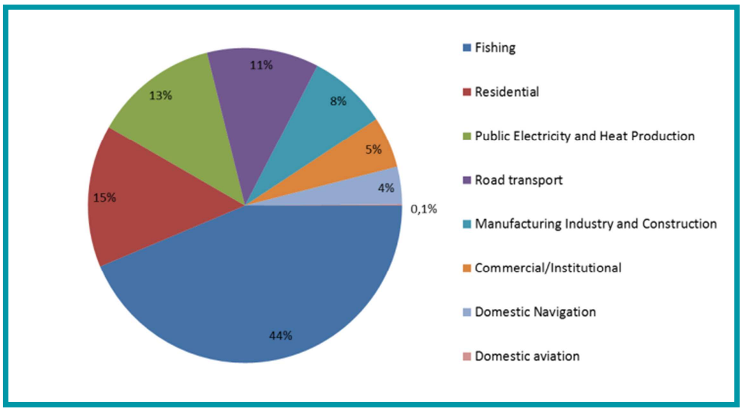


Figure 3.16 shows how the CO_2 emissions are distributed between the energy sub-categories. In 2015 44 % of the CO_2 emission came from fishing vessels. Households accounted for 15 %, public electricity and heat production for 13 % and road transport for 11 % of the total CO_2 emission.

FIGURE 3.16 EMISSIONS OF CO2 IN THE ENERGY SECTOR, DIVIDED IN FUEL CONSUMPTION CATEGORIES, 2015

Source: Nielsen et al. (2017).

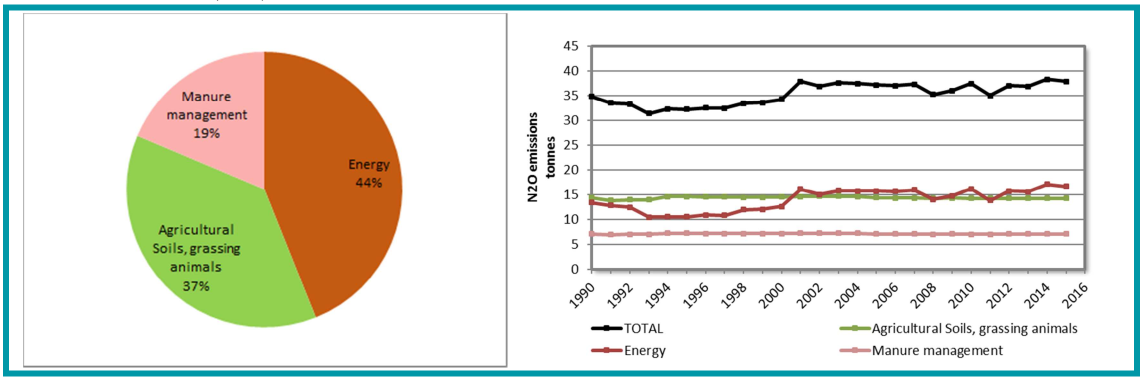


Nitrous oxide, N_2O

Figure 3.17 shows the emissions of nitrous oxide in the Faroe Islands 1990-2015. Around 44 % comes from Energy and another 37 % comes from agricultural soils. The rest, around 19 %, comes from manure management.

FIGURE 3.17 N_2O EMISSIONS BY SECTOR IN 2015 AND DEVELOPMENT 1990-2015

Source: Nielsen et al. (2017).

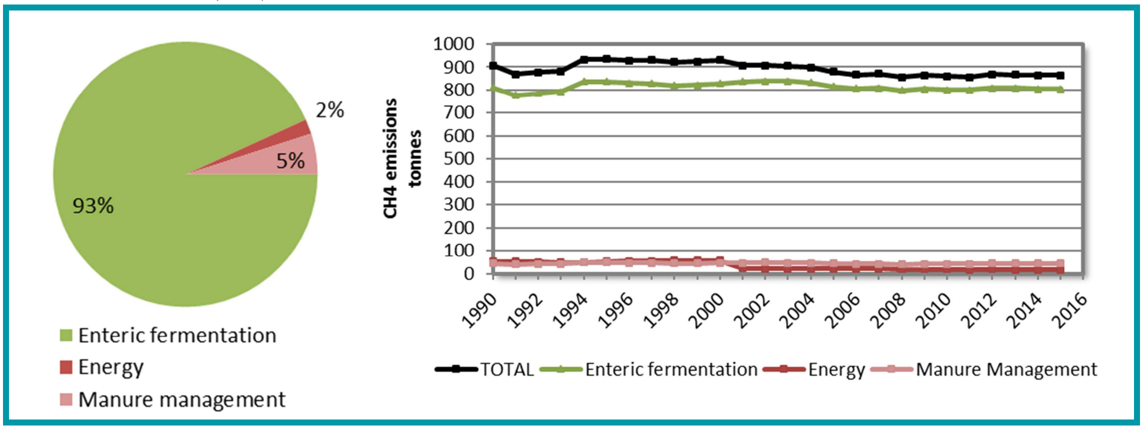


Methane, CH_4

Figure 3.18 shows the emissions of methane in the Faroe Islands 1990-2015. Most of the methane emission is from the agriculture sector, especially from enteric fermentation (93 %). Most of the emission of CH_4 in the energy sector is due to aviation activity.

FIGURE 3.18 CH_4 EMISSIONS BY SECTOR IN 2015AND DEVELOPMENT 1990-2015

Source: Nielsen et al. (2017).

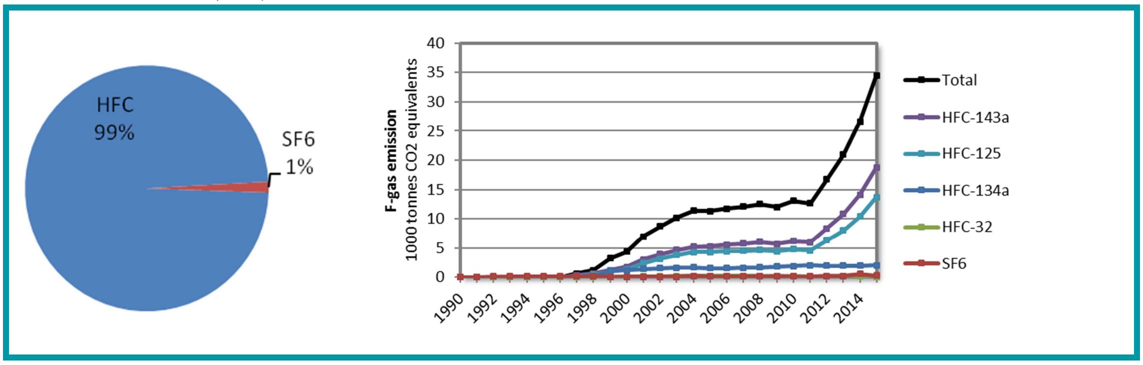


The f-gases: HFCs, PFCs, SF_6 and NF_3

Figure 3.19 shows the emissions of F-gases, HFCs and SF_6 respectively in the years 1990-2015. Most of the emission is HFCs, used for refrigeration purposes, as substitutes for HCFCs. After the emissions increased in the period 1996-2005, the emissions were rather stable at around 12,000 tonnes of CO_2 equivalents pr. year until 2011, where after there has been a steep increase in the emission of HFCs. This is due to higher use of HFC-125 and HFC-143a, both components in the HFC-blend HFC-507a, which in recent years has been used as a substitute when phasing out HCFC-22 (ozone depleting freezing agent) on fishing vessels. In 2015, the emissions of HFC were around 35,000 tonnes of CO_2 equivalents.

FIGURE 3.19 F-GAS EMISSIONS, BY TYPE OF GAS IN 2015 AND DEVELOPMENT 1990-2015

Source: Nielsen et al. (2017).



Neither PFCs nor NF_3 have been used in the Faroe Islands.

3.2.8.2 Summary information on Faroe Islands' national inventory arrangements

The Environment Agency (FEA), an agency under the Ministry of Health and the Interior (www.himr.fo), is responsible for the annual preparation and submission to the UNFCCC of the Faroe Islands' contribution to the Kingdom of Denmark's National Inventory Report and the GHG inventories in the Common Reporting Format in accordance with the UNFCCC Guidelines. The inventory is done with guidance from and in co-operation with DCE. The work is carried out in cooperation with other Faroese ministries, research institutes, organisations and companies.

For more comprehensive information, e.g. about the inventory preparation, calculation methods, annual reporting, improvements of emissions inventories, please see Nielsen et al. (2017).

TABLE 3.4 FAROE ISLANDS' GREENHOUSE GAS EMISSIONS AND REMOVALS BY GAS AND SOURCE AND SINK CATEGORIES IN 1990 - 2015

Source: Nielsen et al., 2017.

GREENHOUSE GAS EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalent (kt)																									
CO_2 emissions without LULUCF	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809
CO_2 emissions with LULUCF	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809
CH_4 emissions without LULUCF	22	22	22	22	22	23	23	23	23	23	23	23	22	22	22	22	22	22	22	21	21	21	21	22	21	21
CH_4 emissions with LULUCF	22	22	22	22	22	23	23	23	23	23	23	23	22	22	22	22	22	22	22	21	21	21	21	22	21	21
N_2O emissions without LULUCF	10	10	10	10	9	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	10	11	11	11
N_2O emissions with LULUCF	10	10	10	10	9	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	10	11	11	11
HFCs	NO	NO	NO	NO	NO	0	0	0	1	1	4	5	8	10	12	13	13	14	14	14	13	14	14	17	21	26
PFCs																										
Unspecified mix of HFCs and PFCs																										
SF_6	NA,NO	NA,NO	NA,NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NF_3																										
Total (without LULUCF)	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868
Total (with LULUCF)	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalent (kt)																									
1. Energy	673	673	654	643	533	538	544	564	560	604	633	670	826	774	779	780	780	773	803	737	769	845	727	813	783	814
2. Industrial processes and product use	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	0	1	2	4	5	8	10	12	13	13	14	14	14	14	14	14	17	21	26
3. Agriculture	28	28	26	27	27	28	28	28	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27	27	27
4. Land use, land-use change and forestry(5)																										
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE
6. Other																										
Total (including LULUCF)(5)	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868

3.3 National systems in accordance with Article 5, paragraph 1, of the Protocol

This section contains information required under Article 7 of the Kyoto Protocol.

3.3.1 Objectives

In pursuance of Article 5, Section 1 of the Kyoto Protocol, the Parties to the Protocol shall establish national systems for the estimation of greenhouse gas emissions. The objective of establishing the national systems is to ensure good quality inventories. This is achieved by following the IPCC Guidelines for planning, implementation and execution of the activities connected with the work on the greenhouse gas inventories. The national system must also ensure that the inventories are transparent, consistent, comparable, complete and accurate.

3.3.2 Organisation of work etc.

The Danish Centre for Environment and Energy (DCE) is responsible for producing the Danish greenhouse gas emission inventories and the annual reporting to the UNFCCC and the DCE has been designated the single national entity under the Kyoto Protocol. The DCE is therefore the contact point for Denmark's national system for greenhouse gas inventories under the Kyoto Protocol. Furthermore, the DCE participates in work under the auspices of the UNFCCC, where guidelines for reporting are discussed and decided upon, and it participates in the EU monitoring mechanism for inventories of greenhouse gases, where guidelines for reporting to the EU are regulated.

The work on the annual inventories is carried out in cooperation with other Danish ministries, research institutes, organisations and private enterprises. The most important partners for this work are mentioned in Box 3.1. For more comprehensive information, please see Nielsen et al. (2017).

The partners mentioned in Box 3.1 provide a range of data that are needed to produce the inventory. The DCE therefore has formal agreements with many of the partners to ensure that the DCE receives the necessary data on time.

BOX 3.1 DCE'S PARTNERS IN THE WORK ON THE ANNUAL INVENTORIES

The Danish Energy Agency, the Danish Ministry of Energy, Utilities and Climate:
Annual energy statistics that are compatible with the format used for emission inventories, fuel consumption data for large incineration plants and plant data reported under the EU ETS.

The Danish Environmental Protection Agency, the Danish Ministry of the Environment and Food:
Database on waste volumes and emissions of fluorinated greenhouse gases (F-gases).

Statistics Denmark, the Danish Ministry for Economic Affairs and the Interior:
Statistical yearbook, sales statistics for industry, and agricultural statistics.

Department of Animal Science, Aarhus University:
Data on use of fertiliser, fodder, and data on nitrogen emissions from livestock.

The Danish Road Directorate, the Danish Ministry of Transport, Building, and Housing:
Number of vehicles grouped by categories corresponding to the EU classifications, kilometres travelled and speeds in town and on main roads and motorways.

The National Centre for Forest, Landscape and Planning, Copenhagen University:
Background data for forests and emissions/ removals associated with forestry.

The Civil Aviation Administration, the Danish Ministry of Transport, Building, and Housing:
Aircraft data (aircraft types and flight routes) for all flight departures and arrivals at Danish airports.

DSB (Danish Railways), the Danish Ministry of Transport, Building, and Housing:
Fuel-related emission factors for diesel locomotives.

Danish enterprises:
Environmental accounts and other information.

3.3.3 Calculation methods

The Danish emission inventory is based on the 2006 IPCC guidelines for calculation of greenhouse gas emissions and the European CORINAIR (COoRdination of INformation on AIR emissions) program for calculation of national emissions. Generally, emissions are calculated by multiplying the activity data (e.g. fuel consumption, number of animals or vehicles) by an emission factor (e.g. the mass of material emitted per unit of energy, per animal or per vehicle). Activity data are mainly based on official statistics. The emission factors are either plant-specific, country-specific, default factors from the IPCC guidelines or values from international scientific literature.

3.3.4 Key categories

The choice of methodological tier for the individual categories depends, among other things, on the significance of the source. The categories that together accounted for 95 % of greenhouse gas emissions in the base year, in 2015 or accounted for 95 % of the change in emission levels from the base year to the most recently calculated year (2015) are defined as key categories according to the IPCC guidelines. An analysis of the Danish inventory shows that 49 categories account for 95 % of total greenhouse gas emissions when considering the inventory including LULUCF and using Approach 1 of the 2006 IPCC Guidelines and that the four largest sources – together accounting for about 46 % – are CO_2 emissions from road transport, CO_2 emissions from combustion of coal at stationary combustion plants, CO_2 from combustion of natural gas at stationary combustion plants and CH_4 from enteric fermentation.

3.3.5 Procedure for recalculation

At the same time as the annual calculation of emissions for a new year are being made, any necessary recalculations of emission inventories from previous years are also carried out. Recalculations are made if errors or oversights are found or if better knowledge becomes available, e.g. updated statistical data, improvements of methodologies, and updated emission factors due to new knowledge and research. In order to ensure consistent emission inventories, recalculations will be carried out on the whole time series, as much as circumstances permit and following the guidance in the IPCC guidelines.

3.3.6 Uncertainty

Uncertainty in the greenhouse gas inventories is calculated as recommended in the IPCC guidelines and covers 100 % of the total Danish greenhouse gas (GHG) emissions reported under the Kyoto Protocol. The result of the calculations shows that total GHG emissions were calculated using Approach 1 of the 2006 IPCC Guidelines to have an uncertainty of 5.4 % and the uncertainty in the trend in GHG emissions since 1990 was calculated to be ± 2.0 %. The uncertainties are largest for N_2O emissions from stationary combustion and agricultural land and CH_4 emissions from enteric fermentation and solid waste disposal on land.

3.3.7 Quality assurance and quality control

As part of the national system, DCE is drawing up a manual to use in quality assurance and quality control of the emission inventories. The manual is in accordance with the 2006 IPCC Guidelines. The ISO 9000 standards are also being used as important input for the plan.

Reports are written for all sources of emissions and these describe in detail and document the data and calculation methods used. These reports are evaluated by persons external to the DCE who are experts in the area in question, but not directly involved in the inventory work. In addition, a project has been completed in which the Danish calculation methods, emission factors and uncertainties are compared with those of other countries, in order to further verify the correctness of the inventories.

For more detailed description of the QA/QC system, please see the Danish National Inventory Report (Nielsen et al., 2017).

3.3.8 Annual reporting

The DCE produces an annual report (National Inventory Report (NIR)[4]) for the Climate Convention in which the results of the calculations are presented and the background data, calculation methods, plan for quality assurance and control, uncertainty and recalculations are described and documented. At the request of the Climate Convention, the report is evaluated each year by international experts. Over the years, improvements have been made regarding the quality and documentation of the greenhouse gas inventory as a result of the quality assurance and control procedures and the evaluations of national and international experts. The planned improvements can be found in the following section.

3.3.9 Activities under Article 3.3 and 3.4 of the Kyoto Protocol

Under the Kyoto Protocol, Denmark and Greenland elected activities Cropland Management and Grazing Land Management. The documentation for the methodologies used in estimating the emissions and removals from the elected activities are described in detail in the National Inventory Report (Nielsen et al., 2017). Documentation is provided in the NIR for both Denmark and Greenland in separate chapters as per recommendations received by Expert Review Teams during their annual reviews of the greenhouse gas inventory.

3.3.10 Information under Article 10(a) of the Protocol on improvements of emission inventories

A number of improvements have been made to the Danish greenhouse gas emission inventories since Denmark's Sixth National Communication to the Climate Convention (NC6). The improvements have either been done on the initiative of the DCE, or as a result of external reviews of the inventories. The majority of improvements have been concerned with better documentation, i.e. improvements in transparency. Furthermore, overall focus in future will be on improving procedures for quality assurance and control and on improving documentation of the national emission factors.

3.3.11 Procedures for the official consideration and approval of the inventory

The complete emission inventories for the three different submissions (EU, Kyoto Protocol and UNFCCC) by Denmark are compiled by DCE and sent for official approval along with the documentation report (NIR). In recent years the responsibility for official approval has changed. Previously it was the Danish Energy Agency under the Ministry of Energy, Utilities and Climate, but now the responsibility lies with the Ministry itself. This means that the emission inventory is finalised no later than March 15, so that the official approval is prior to the reporting deadlines under the UNFCCC and the Kyoto Protocol.

3.4 National Registry

3.4.1 Background

Since NC6 was published, minor changes have occurred regarding the National Registry. This chapter describes the National Registry as it has been operated since June 2012, when the EU ETS operations were centralized into a single European Union registry operated by the European Commission.

The ETS operates in 31 countries: the 28 EU Member States plus Iceland, Liechtenstein and Norway. It covers CO_2 emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board.

Directive 2009/29/EC, adopted in 2009, provides for the centralization of the EU ETS operations into a single European Union registry operated by the European Commission as well as for the inclusion of the aviation sector. At the same time, and with a view to increasing efficiency in the operations of their respective national registries, the EU Member States who are also Parties to the Kyoto Protocol plus Iceland, Liechtenstein and Norway decided to operate their registries in a consolidated manner in accordance with all relevant decisions applicable to the establishment of Party registries - in particular Decision 13/CMP.1 and Decision 24/CP.8.

3.4.2 Statutory basis

The National Allowances Registry (the Danish accounts in the EU ETS Registry as well as the Danish national KP Registry) is administered pursuant to Danish Act on CO_2 Allowances (Act no. 1605 of 14 December 2016). The Act implements EU Directive 2003/87/EC (EU ETS directive) as amended by EU Directive 2009/29/EC. Pursuant to sections 21 and 22 of the Act, the Danish Minister for Industry, Business and Financial Affairs is responsible for administering the Danish KP Registry as well as Danish accounts in the consolidated EU ETS Registry. In Executive Order no. 1357 of 17 December 2012, the Danish Minister for Industry and Financial Affairs delegated the administration of the registries to the Danish Business Authority.

Executive Order no. 95 of 29 January 2015 on the EU ETS Registry and the Danish Kyoto Registry sets the requirements for account holders e.g. the requirements for documentation and the applicable fees to be paid for accounts in the registries.

3.4.3 Organisation and operation of the Registry

The Danish national registry is operated as part of the Consolidated System of EU Registries. The consolidated platform which implements the national registries in a consolidated manner (including the registry of the EU) is called the Union registryand was developed together with the new EU Registry on the basis the following modalities:

(1) Each Party retains its organization designated as its registry administrator to maintain the national registry of that Party and remains responsible for all the obligations of Parties that are to be fulfilled through registries;

(2) Each Kyoto unit issued by the Parties in such a consolidated system is issued by one of the constituent Parties and continues to carry the Party of origin identifier in its unique serial number;

(3) Each Party retains its own set of national accounts as required by paragraph 21 of the Annex to Decision 15/CMP.1. Each account within a national registry keeps a unique account number comprising the identifier of the Party and a unique number within the Party where the account is maintained;

(4) Kyoto transactions continue to be forwarded to and checked by the UNFCCC Independent Transaction Log (ITL), which remains responsible for verifying the accuracy and validity of those transactions;

(5) The transaction log and registries continue to reconcile their data with each other in order to ensure data consistency and facilitate the automated checks of the ITL;

(6) The requirements of paragraphs 44 to 48 of the Annex to Decision 13/CMP.1 concerning making non-confidential information accessible to the public would be fulfilled by each Party through a publically available web page hosted by the Union registry;

(7) All registries reside on a consolidated IT platform sharing the same infrastructure technologies. The chosen architecture implements modalities

to ensure that the consolidated national registries are uniquely identifiable, protected and distinguishable from each other, notably:

(a) With regards to the data exchange, each national registry connects to the ITL directly and establishes a distinct and secure communication link through a consolidated communication channel (VPN tunnel);

(b) The ITL remains responsible for authenticating the national registries and takes the full and final record of all transactions involving Kyoto units and other administrative processes such that those actions cannot be disputed or repudiated;

(c) With regards to the data storage, the consolidated platform continues to guarantee that data is kept confidential and protected against unauthorized manipulation;

(d) The data storage architecture also ensures that the data pertaining to a national registry are distinguishable and uniquely identifiable from the data pertaining to other consolidated national registries;

(e) In addition, each consolidated national registry keeps a distinct user access entry point (URL) and a distinct set of authorisation and configuration rules.

Following the successful implementation of the Union Registry, the 28 national registries concerned were re-certified in June 2012 and switched over to their new national registry on 20 June 2012. Croatia was migrated and consolidated as of 1 March 2013. During the go-live process, all relevant transaction and holdings data were migrated to the Union Registry platform and the individual connections to and from the ITL were re-established for each Party. The changes to the national registry since NC6 are shown in Table 3.5.

TABLE 3.5 CHANGES TO THE EU NATIONAL REGISTRY SINCE NC6 (JANUARY 2014)

Source: Danish Business Authority

Reporting Item	Description of changes, if any
15/CMP.1 Annex II.E paragraph 32.(a) Change of name or contact	None
15/CMP.1 Annex II.E paragraph 32.(b) Change regarding cooperation arrangement	No change of cooperation arrangement occurred during the reported period.
15/CMP.1 Annex II.E paragraph 32.(c) Change to database structure or the capacity of national registry	In 2016 new tables were added to the database for the implementation of the CP2 functionality. Versions of the Union registry released after 6.1.6 (the production version at the time of the last NC submission) introduced other minor changes in the structure of the database. These changes were limited and only affected EU ETS functionality. No change was required to the database and application backup plan or to the disaster recovery plan. No change to the capacity of the national registry occurred during the reported period.
15/CMP.1 Annex II.E paragraph 32.(d) Change regarding conformance to technical standards	Each release of the registry is subject to both regression testing and tests related to new functionality. These tests also include thorough testing against the DES and were successfully carried out prior to each release of a new version in Production. Annex H testing is carried out every year. No other change in the registry's conformance to the technical standards occurred for the reported period.
15/CMP.1 Annex II.E paragraph 32.(e) Change to discrepancies procedures	No change of discrepancies procedures occurred during the reported period.

3.4.4 Administrative set-up

The administration of the Danish national registry and, thus, the role as registry administrator is situated with the Danish Business Authority under the Danish Ministry of Industry, Business and Financial Affairs.

Users can contact the Danish Business Authority directly by phone or email for help in using the Registry.

Businesses and users of the Registry are kept informed about regulations, news etc. through regular updates on the Danish Business Authority's website, the news on the Registry website and a newsletter from the Registry staff. The newsletter is issued as required and informs about new regulations and opportunities as well as any planned temporary closures (for updates etc.).

The Danish Business Authority performs Know Your Customer Checks (KYC) before giving new businesses or users access to the registry and reassess the KYC on regular bases. Furthermore the Danish Business Authority seek to minimize the risk of fraud through profound checks of trading and intensive cooperation with Financial Investigation Units as well as registry administrators in other countries.

3.4.5 Registry software

The Danish Business Authority is using the common software developed by the European Commission. Further information on the National Registry is included in the Annexes A2, A3 and A4.

3.5 INVENTORY INFORMATION UNDER THE KYOTO PROTOCOL AND DENMARK'S BASE YEAR EMISSIONS, ASSIGNED AMOUNT AND GREENHOUSE GAS INVENTORIES IN RELATION TO THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL

As mentioned above, the GHG inventory of the Kingdom of Denmark under the Kyoto Protocol covers Denmark and Greenland as the Kyoto Protocol was ratified in 2002 with a territorial exclusion to the Faroe Islands in accordance with a request from the Faroese Parliament.

3.5.1 2008-2012

In the protocol's first commitment period 2008-2012 Denmark took on – as Denmark's contribution to the joint 8% reduction target of 15 Member States of the European Union – a 21% reduction target. Denmark is part of the European Union while Greenland is not. Greenland had a 8% reduction target in the protocol's first commitment period. Both EU15, Denmark and Greenland reached these targets[5]. The combined greenhouse gas emissions of Denmark and Greenland are shown in Table 3.6.

TABLE 3.6 DENMARK'S AND GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES, 1990 - 2015

Source: Nielsen et al., 2017.

GREENHOUSE GAS EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalent (kt)																									
CO_2 emissions without LULUCF	54215	54215	64819	58997	61187	65197	62149	75459	66073	61814	59231	54964	56488	56122	61275	55740	52166	60090	55297	51882	49407	49849	44895	40227	42194	37970
CO_2 emissions with LULUCF	59071	59071	69034	63944	65387	69101	66285	78801	69901	65822	63299	59110	61389	62121	66887	61009	57336	65646	58125	49873	51562	48975	42395	39890	43184	38028
CH_4 emissions without LULUCF	7640	7640	7830	7908	8102	7993	8067	8181	8072	8127	8032	7923	8161	8089	8095	7920	7687	7591	7576	7445	7300	7362	7200	7072	6965	6961
CH_4 emissions with LULUCF	7659	7659	7850	7930	8125	8018	8094	8210	8102	8159	8065	7958	8198	8127	8135	7963	7731	7637	7623	7494	7351	7414	7254	7130	7025	7019
N_2O emissions without LULUCF	7894	7894	7721	7459	7264	7188	7146	6792	6827	6903	6983	6939	6722	6720	6593	6137	5485	5381	5557	5507	5248	5150	5163	5043	5046	5151
N_2O emissions with LULUCF	7921	7921	7748	7487	7291	7215	7173	6819	6854	6930	7010	6966	6749	6746	6619	6164	5512	5408	5584	5534	5274	5177	5191	5071	5075	5180
HFCs	NO,NE,NA	NO,NE,NA	NO,NE,NA	4	102	146	241	380	377	476	583	706	739	785	818	882	939	964	996	1000	959	958	895	809	790	710
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0	1	2	5	11	16	23	28	28	25	21	19	21	21	18	20	19	16	12	11	9
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	42	42	61	85	97	116	102	58	70	57	62	56	28	23	30	31	20	33	28	29	34	36	69	112	131	132
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	69792	69792	80431	74453	76751	80641	77706	90873	81423	77388	74907	70610	72166	71766	76834	70729	66315	74081	69476	65882	62968	63375	58238	53276	55137	50933
Total (with LULUCF)	74694	74694	84693	79449	81002	84597	81896	94270	85309	81455	79036	74818	77132	77831	82513	76068	71556	79709	72378	63948	65200	62579	55819	53025	56215	51078
Total (without LULUCF, with indirect)	**71009**	**71009**	**81690**	**75682**	**77957**	**81802**	**78844**	**91997**	**82471**	**78393**	**75845**	**71484**	**73016**	**72577**	**77630**	**71494**	**67050**	**74778**	**70132**	**66509**	**63539**	**63931**	**58743**	**53751**	**55588**	**51354**
Total (with LULUCF, with indirect)	75911	75911	85952	80677	82207	85759	83034	95394	86357	82460	79973	75692	77981	78642	83309	76833	72291	80407	73034	64576	65770	63135	56323	53500	56666	51499

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	CO_2 equivalent (kt)																									
1. Energy	53027	53027	63707	57872	60153	64155	61123	74602	65134	61027	58605	54208	55847	55386	60684	55114	51428	59341	54492	51275	49175	49790	44513	39695	41570	37255
2. Industrial processes and product use	2344	2344	2470	2523	2593	2706	2879	3022	3106	3205	3444	3634	3519	3473	3488	3319	2796	2855	2884	2583	2100	2042	2184	2130	2142	2080
3. Agriculture	12640	12640	12466	12290	12239	12083	12088	11669	11680	11693	11324	11237	11234	11312	11055	10993	10798	10535	10760	10704	10416	10336	10338	10284	10287	10409
4. Land use, land-use change and forestry	4902	4902	4262	4995	4251	3956	4190	3397	3886	4067	4129	4208	4965	6065	5679	5339	5241	5629	2902	-1933	2232	-796	-2419	-251	1078	145
5. Waste	1781	1781	1788	1768	1767	1697	1616	1580	1504	1464	1535	1531	1566	1595	1607	1303	1293	1349	1340	1320	1277	1206	1203	1168	1138	1189
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)	74694	74694	84693	79449	81002	84597	81896	94270	85309	81455	79036	74818	77132	77831	82513	76068	71556	79709	72378	63948	65200	62579	55819	53025	56215	51078

3.5.2 2013-2020

In relation to the protocol's second commitment period 2013-2020, the quantified emission limitation and reduction commitment (QELRC) for the European Union, its member States and Iceland will be fulfilled jointly in accordance with Article 4 of the Kyoto Protocol. Denmark's contribution to fulfil the commitments of the European Union, its Member States and Iceland under Article 3 of the Kyoto Protocol is determined by the agreement under Article 4 of the Kyoto Protocol. This agreement was submitted to the UNFCCC secretariat in June 2016 as part of Denmark's Initial Report to be submitted in accordance with Decision 2/CMP.8 to facilitate the calculation of the assigned amount pursuant to Article 3, paragraphs 7bis, 8 and 8bis (cf. Decision 1/CMP.81) and Article 4, of the Kyoto Protocol for the second commitment period. As the target for the second commitment period under the Kyoto Protocol will be ratified with territorial exclusion to Greenland in accordance with an agreement with the government of Greenland, the assigned amount for Denmark excludes Greenland and is solely based on the agreement between the European Union, its Member States and Iceland and the application of Article 3, paragraph 7bis of the Kyoto Protocol.

The respective emission level allocated to Denmark is set out in the agreement between the EU, its 28 Member States and Iceland. The emission level allocated to Denmark is related to the EU's total reduction commitment through the EU Effort Sharing Decision (ESD) as part of the EU Climate and Energy Package adopted in 2008. With the ESD, Denmark has undertaken a legal commitment to reduce total emissions of greenhouse gases not covered by the EU Emission Trading Scheme by 20 per cent in 2020, compared to the level of these emissions in 2005. Furthermore, in the period 2013-2019 these emissions also have to stay below a fixed annual amount of so-called Annual Emission Allocation (AEA).

The sum of the respective annual emission levels 2013-2020 allocated to Denmark under the ESD (269,321,526 units) and the application of Article 3, paragraph 7bis of the Kyoto Protocol (56,364 units) is equal to Denmark's share of the total assigned amount for EU28+ISL. According to the review report from the review of Denmark's Initial Report to be submitted in accordance with Decision 2/CMP.8 to facilitate the calculation of the assigned amount, the number of assigned amount units to be issued by Denmark for the second commitment period under the Kyoto Protocol is 269,377,890 AAUs[6].

This is shown in Table 3.7 together with the base year information and the calculated minimum holding of 242,440,102 tonnes CO_2 equivalents in the National Registry – the so-called commitment period reserve (CPR).

TABLE 3.7 DENMARK'S BASE YEAR EMISSIONS, ASSIGNED AMOUNT AND COMMITMENT PERIOD RESERVE FOR THE SECOND COMMITMENT PERIOD UNDER THE KYOTO PROTOCOL

Source: The UNFCCC's report of the review of Denmark's initial report to be submitted in accordance with Decision 2/CMP.8 to facilitate the calculation of the assigned amount, 2017.

Tonnes CO_2 equivalents	**Denmark under the EU**
CO_2 (1990)*	54,785,159
CH_4 (1990)*	7,864,426
N_2O (1990)*	7,799,032
HFCs (1995)	241,456
PFCs (1995)	634
SF_6 (1995)	102,398
Base year	**70,793,103**
Land-use change: Deforestation in 1990 (Article 3.7bis as contained in the Doha amendment to the Kyoto Protocol)	8,807
Application of Article 3.7bis (80% of emissions from deforestation in 1990 times 8)	56,364
Total Assigned Amount 2013-2020	**269,377,890**
Commitment Period Reserve (CPR)	**242,440,102**

* including indirect CO_2 emissions and excluding LULUCF

3.6 TRENDS IN DANISH GREENHOUSE GAS EMISSIONS IN THE EU TERRITORY FROM THE BASE YEAR UNDER THE KYOTO PROTOCOL

The developments in Danish emissions and removals of greenhouse gases in the EU territory (i.e. excluding Greenland and Faroe Islands) from the base year under the Kyoto Protocol to 2015 (the most recent inventory year), as they are to be inventoried under the Kyoto Protocol, are shown in Table 3.8 together with a preliminary estimate for 2016.

TABLE 3.8 DANISH EMISSIONS OF GREENHOUSE GASES IN THE EU TERRITORY INVENTORIED ACCORDING TO REGULATIONS UNDER THE KYOTO PROTOCOL (WITH INDIRECT CO_2, WITHOUT LULUCF)

Source: The UNFCCC's Report of the review of the initial report of Denmark, 2017 (base year), Nielsen et al., 2017 (1990-2015), the 2016 preliminary estimate elaborated by DCE and based on the preliminary energy statistics for 2016 by the Danish Energy Agency.

	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Million tonnes of CO_2 equivalents	70,8	70,4	81,1	75,1	77,4	81,3	78,3	91,4	81,8	77,8	75,2	70,8	72,4	72,0
Index (base year=100)	100	99	114	106	109	115	111	129	116	110	106	100	102	102
Continued	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016[2]**
Million tonnes of CO_2 equivalents	76,9	70,8	66,4	74,1	69,4	65,8	62,9	63,2	58,0	53,1	55,0	50,8	48,3	*49,7*
Index (base year=100)	109	100	94	105	98	93	89	89	82	75	78	72	68	*70*

[1] In accordance with the Kyoto Protocol, the base year for the second commitment period is composed of emissions of CO_2, methane and nitrous oxide in 1990 and emissions of so-called industrial greenhouse gases in 1995.
[2] Preliminary estimate (proxy).

The relatively great variations in previous total emissions of greenhouse gases are especially due to variations in Denmark's exchange of electricity with neighbouring countries. Furthermore, emissions of CO_2 from energy consumption vary considerably from year to year, depending on winter temperatures.

In order to facilitate the assessment of developments in CO_2 emissions associated with Denmark's own energy consumption in normal winters, the figures are shown in Table 3.9 with corrections made for exchange of electricity and variations in temperature. As can be seen from this table, there has been a 34% decrease from the base year to 2015. The preliminary estimate for 2016 suggests an increase of 1 percentage point.

TABLE 3.9 DENMARK'S GREENHOUSE GAS EMISSIONS (WITH INDIRECT CO_2, WITHOUT LULUCF) CORRECTED FOR INTER-ANNUAL VARIATIONS IN TEMPERATURES AND EXCHANGE OF ELECTRICITY

Source: As in Table 3.8 but with the Danish Energy Agency's corrections of CO_2 emissions for degree days and net electricity imports applied.

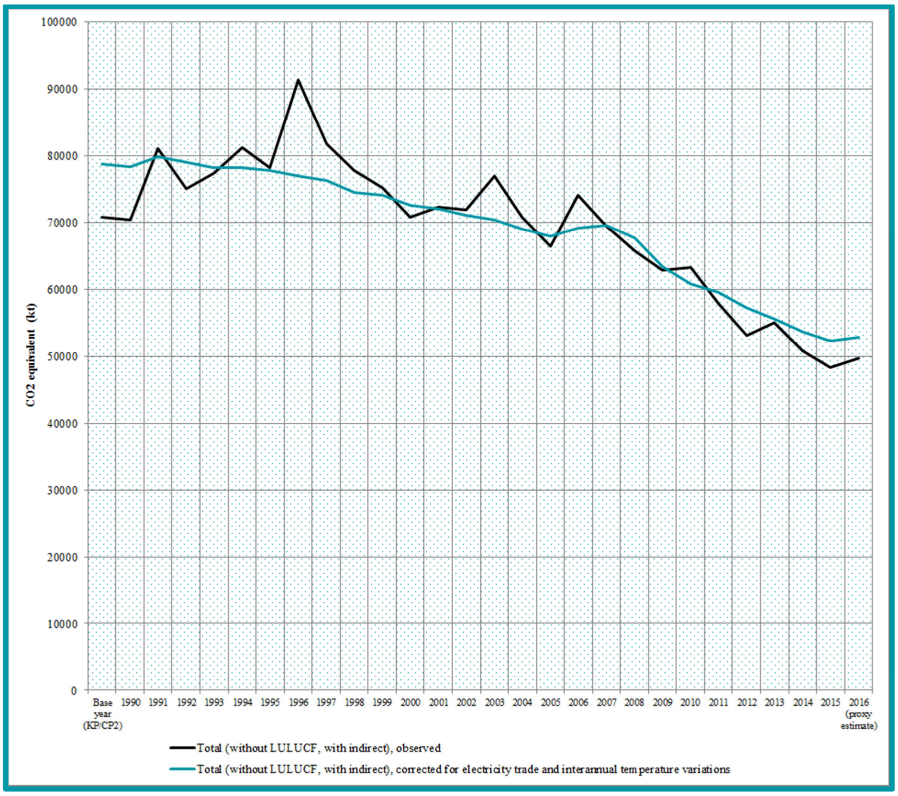
	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Million tonnes of CO_2 equivalents	78,8	78,3	79,8	79,1	78,2	78,2	77,8	77,0	76,3	74,6	74,1	72,5	72,0	71,1
Index (base year=100)	100	99	101	100	99	99	99	98	97	95	94	92	91	90
Continued	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016[2]**
Million tonnes of CO_2 equivalents	70,5	69,0	67,9	69,2	69,5	67,7	63,3	60,9	59,5	57,2	55,5	53,7	52,4	*52,9*
Index (base year=100)	89	88	86	88	88	86	80	77	76	73	71	68	66	*67*

[1] The base year is composed of emissions of CO_2, methane and nitrous oxide in 1990 and emissions of so-called industrial greenhouse gases in 1995. Since Denmark's legal commitments under the Kyoto Protocol is to be seen in relation to figures without corrections, the figures in the table can only be used to illustrate the effects of measures taken to limit CO_2 emissions associated with Denmark's own energy consumption.

The effects of inter-annual variations in temperatures and exchange of electricity are illustrated in Figure 3.20.

FIGURE 3.20: DENMARK'S GREENHOUSE GAS EMISSIONS 1990-2016 WITHOUT AND WITH CORRECTIONS FOR INTER-ANNUAL VARIATIONS IN TEMPERATURES AND EXCHANGE OF ELECTRICITY

Source: The UNFCCC's Report of the review of the initial report of Denmark, 2017 (base year), Nielsen et al., 2017 (1990-2015), the 2016 preliminary estimate elaborated by DCE and based on the preliminary energy statistics for 2016 by the Danish Energy Agency and with corrections of CO_2 emissions for degree days and net electricity imports and the preliminary estimate for 2016 from the Danish Energy Agency.



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[3] Nielsen et al., 2017.

[4] http://envs.au.dk/videnudveksling/luft/emissioner/emissioninventory/

[5] http://unfccc.int/kyoto_protocol/final_compilation_and_accounting_report_for_the_first_commitment_period/items/9691.php

[6] http://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600009721#beg

4

POLICIES AND MEASURES

- INCLUDING THOSE IN ACCORDANCE WITH ARTICLE 2 OF THE KYOTO PROTOCOL, AND DOMESTIC AND REGIONAL PROGRAMMES AND/OR LEGISLATIVE ARRANGEMENTS AND ENFORCEMENT AND ADMINISTRATIVE PROCEDURES

4 Policies and measures

- including those in accordance with Article 2 of the Kyoto Protocol, and domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures

4.1 CLIMATE POLICY AND THE POLICY-MAKING PROCESS

Since the Brundtland Commission's report, "Our Common Future", from 1987, Denmark's climate policy has developed in collaboration with the different sectors of society, and in line with international climate policy, and results from related scientific research.

Thus, since the end of the 1980s a considerable number of measures to reduce emissions of greenhouse gases have been implemented.

Some of the measures have been implemented with reduction of greenhouse gas emissions as the main objective, others were aimed at achieving environmental improvements for society in general, e.g. by introducing environmental taxes and involving the public in the debate and decisions concerning the environment.

Since 2001, focus has also been on efforts to reduce emissions and meet the near-term international greenhouse gas emission reduction targets – i.e. for 2008-2012 under the first commitment period of the Kyoto Protocol and the EU Burden Sharing and for 2013-2020 under the second commitment period of the Kyoto Protocol and the EU Effort Sharing Decision – with view to meet the government's long-term target for 2050: a low-emission society independent of fossil fuels to ensure that Denmark complies with the EU's target of 80-95 per cent reduction of greenhouse gases by 2050.

Denmark's international climate targets are described in Box 4.1.

BOX 4.1 INTERNATIONAL CLIMATE TARGETS

Since 1990 Denmark has undertaken or committed itself to several targets with respect to reducing greenhouse gas emissions:

- In accordance with the Climate Convention, to reduce total emissions of greenhouse gases in Denmark, Greenland and the Faroe Islands to the 1990 level by 2000. This target was achieved for total emissions excluding the land-use sector (LULUCF). Due to windfalls total emissions including LULUCF brought the Realm to within 1% of the target.
- As a contribution to stabilisation in the EU, Denmark committed itself to reducing CO_2 emissions in 2000 by 5% compared to the adjusted level for 1990. This target was fulfilled.
- In relation to the Kyoto Protocol, for the period 2008-2012 the EU committed itself to reducing emissions of greenhouse gases on average to 8% below the level in the base year; 1990 for CO_2, methane, and nitrous oxide and either 1990 or 1995 for industrial greenhouse gases. Denmark committed itself to a reduction of 21% as an element of the burden-sharing agreement within the EU. Both Denmark and the EU reached these targets.
- In relation to the period 2013-2020, the EU reached an agreement in December 2008 on a climate and energy package and on a regulation on CO_2 from new vehicles. According to this package the EU is committed to reducing its overall emissions to at least 20% below 1990 levels by 2020. Under the EU burden sharing of the joint EU target for 2020, Denmark is committed to a reduction in non-ETS emissions in the period 2013-2020, rising to 20% by 2020 relative to 2005. The EU is also committed to reducing its ETS emissions to 21% below 2005 levels by 2020. The EU has also set itself the target of increasing the share of renewables in energy use to 20% by 2020. Under burden sharing for this EU target, Denmark is committed to reaching a 30% share of renewables in energy use by 2020.

- In relation to the period 2021-2030, the European Council agreed on the 2030 climate and energy framework in October 2014 and endorsed four important targets: (1) a binding EU target of at least 40% less greenhouse gas emissions by 2030, compared to 1990, (2) a target, binding at EU level, of at least 27% renewable energy consumption in 2030, (3) an indicative target at EU level of at least 27% improvement in energy efficiency in 2030 and (4) support the completion of the internal energy market by achieving the existing electricity interconnection target of 10% as a matter of urgency no later than 2020, in particular for the Baltic states and the Iberian Peninsula, and the objective of arriving at a 15% target by 2030. The agreement on the 2030 framework, specifically the EU domestic greenhouse gas reduction target of at least 40%, formed the basis of the EU's contribution to the Paris Agreement. The EU's so-called Intended Nationally Determined Contribution (INDC) was formally approved at an Environment Council meeting in March 2015. In October 2017 the EU member states reached an agreement on the burden sharing for the period 2021-2030, for which the final approval is pending (the European Parliament and the European Council reached a provisional agreement on the effort sharing regulation on 21 December 2017). Under the EU burden sharing of the joint EU target for 2030, Denmark is committed to a reduction in non-ETS emissions in the period 2021-2030, rising to 39% by 2030 relative to 2005. The EU is also committed to reducing its ETS emissions to achieve the 40% below 1990 levels by 2030 in total greenhouse gas emissions. The EU has also set itself the target of increasing the share of renewables in energy use to 27% by 2030. Denmark is committed to reaching a 50% share of renewables in energy use by 2030.

The following sections contain more information about the Danish government's Government Platform from November 2016 and the Energy Agreement from March 2012.

This is followed by sector by sector descriptions of Denmark's climate policies and measures.

4.1.1 National action plans

In 1988 the government issued the Government's Action Plan for Environment and Development. The plan was a follow-up on the Brundtland Report and was based in principle on striving for environmentally sustainable development. One of the main messages in the plan was the need to integrate environmental considerations into decisions and administration within such sectors as transport, agriculture and energy.

In the years since then, a number of ministries have prepared sector action plans in which the environment is an integral element. The sector action plans deal with the entire development in a sector combined with solutions to environmental problems caused by the sector. The sector plans for energy, transport, forestry, agriculture, the aquatic environment, waste, and development assistance are important examples.

The plans from the 1990s all contained specific environmental objectives and, usually, deadlines for achieving them. In addition, there were a number of concrete initiatives that are intended to lead to achievement of the objectives. Progress has been evaluated regularly to check whether the implementation of the plans resulted in achievement of the objectives. The results of the evaluations have been presented in political reports from the sector ministries or in special follow-up reports.

The evaluations and follow-up have often given rise to the preparation of new action plans, either because additional initiatives have been necessary in order to achieve the objectives or because the development of society or developments within the area in question have made it necessary to change both objectives and initiatives. Major sector plans that have been of importance for the reduction of greenhouse gas emissions are:

- The NPO Action Plan on pollution from livestock manure (1985)
- Action Plan for the Aquatic Environment I (1987)
- Energy 2000 (1990)
- Action plan for sustainable development in the agricultural sector (1991)
- Strategy for sustainable forest management (1994)
- Strategy 2000 - Danish strategy in the development assistance area (1995)
- Energy 21 (1996)
- Action plan for reduction of the transport sector's CO_2 emissions (1996)
- National sub-strategy for Danish environmental and energy research (1996)
- Action Plan for the Aquatic Environment II (1998)
- Action Plan II - Ecology in Development (1999)
- Waste 21 (1999)
- Action plan for reduction of industrial greenhouse gas emissions (2000)
- Reduction of the transport sector's CO_2 emissions - possibilities, policies and measures (2000)
- Reduction of the transport sector's CO_2 emissions - the government's action plan (2001)
- Denmark's national forest programme (2002)
- Denmark's National Strategy for Sustainable Development (2002)
- National Climate Strategy for Denmark (2003)
- Waste Strategy 2005-2008 (2003)
- Action Plan for the Aquatic Environment III (2004)
- 1st National Allocation Plan 2005-2007 under the EU-ETS (2004)
- Energy Strategy 2025 (2005)
- Action Plan for Strengthened Energy-saving Efforts (2005)
- 2nd National Allocation Plan 2008-2012 under the EU-ETS (2007)
- Political agreement on Energy (2008)
- Political agreement on a Green Transport Vision for Denmark (2009)
- Political agreement on a Tax Reform (2009)
- Growth with Consideration – the government's strategy for sustainable development (2009)
- Strategy for reducing energy consumption in buildings (2009)
- Political agreement on a Green Growth Plan (2009)
- Waste Strategy 2009-2012 – Part I (2009)
- Waste Strategy 2009-2012 – Part II (2010)
- Energy Strategy 2050 (2011)
- Our Future Energy (2011)
- Political Agreement on Energy (2012)
- The Danish Climate Policy Plan – Towards a low carbon society (2013)
- The Agricultural Package (2016)

The sector plans deal with different aspects of the climate problem. In the energy and transport sectors, the main environmental concern has been the emissions of the greenhouse gas CO_2. The plans in these sectors were therefore to a great extent concerned with reducing CO_2.

The frameworks for the Danish energy sector, however, have changed quite significantly over a short period of time. The goal of Danish energy policy today is to create well-functioning energy markets within frameworks that secure cost-effectiveness, security of supply, environmental concerns and efficient use of energy under conditions of a fully liberalised energy sector. Electricity production from

Danish power plants is controlled by market forces and traded freely across national borders.

The introduction of CO_2 quota regulation as a common EU instrument has therefore been of absolute importance to Denmark meeting its climate commitments. From 2005, quota regulation through the EU emissions trading scheme (EU ETS) has been the key instrument to ensuring that the Danish energy sector can contribute to the reductions requisite to fulfilling Denmark’s climate commitments.

The other sector plans are not primarily focused on reducing greenhouse gas emissions, in part because the sectors are battling with other major environmental problems. The main concern in the agricultural sector has been pollution of the aquatic environment. In the waste sector it has been reduction of the volume of waste, and in the industrial sector, reduction of emissions/discharges of harmful substances to the atmosphere/aquatic environment, the use of toxic substances, etc.

However, the implementation of the sector plans has to a great extent also resulted in reduction of greenhouse gas emissions. For example, the reduction in nitrogen emissions from the agricultural sector, which is the result of the aquatic environment plans, is at the same time reducing emissions of the greenhouse gas nitrous oxide. The initiatives to reduce waste quantities mean fewer landfill sites and thus less formation and emissions of methane, and the on-going increase in forested area will mean increased removals of CO_2.

In addition, the energy and transport plans meant that changes were made in the energy and transport sectors. The initiatives in the energy sector have resulted in reduced energy consumption despite significant economic growth and, with that, reduced CO_2 emissions.

On the environment policy front, Denmark has participated actively in improving environmental protection in Europe through the EU cooperation and through bilateral environmental assistance to Central and Eastern European countries. On a number of points, the EU's environmental regulation has put Europe ahead of the rest of world environmentally. There are also many examples of EU rules having helped to strengthen environmental protection in Denmark. With the adoption of the Amsterdam Treaty, sustainable development became a main objective for the EU, and integrating environmental considerations in the EU's sector policies became an obligation.

4.1.2 Denmark's Climate Policy

4.1.2.1 The 2016 Government Platform

In November 2016, the new Danish government stated in its Government Platform that it will continue to pursue an ambitious green transition in a sustainable and efficient manner where the interest of Danish jobs and competitiveness goes hand in hand with respect for the environment and climate.

The government takes the lead in the green transformation, and therefore the life cycle perspectives should increasingly be taken into account in the decision making for public investments and acquisitions in order to be assessed by the total lifetime costs, rather than the investment costs alone.

With the climate agreement from Paris (December 2015), the world leaders agreed that the global average temperature increase should be kept well below 2 degrees and preferably not exceed 1.5 degrees.

Denmark will nationally work to contribute to the fulfilment of this ambitious goal, but taking into account Denmark's share of the total greenhouse gas emissions; it is of utmost importance to seek influence internationally. Therefore, the government's climate policy has both a national and an international focus.

National focus
A target of 40 per cent GHG reduction by 2020 compared to 1990, has for years helped to promote climate action and transformation of the energy system. Recently, a large majority of the parties decided to replace the PSO and instead finance the costs of renewable energy through the national budget. This change will reduce the price of electricity and increase power consumption. In the short term this could increase greenhouse gas emissions from Danish soil, but promote the transition towards a society based on green power, and contribute to reducing global greenhouse gas emissions.

Greenhouse gas emissions will continue to decrease. Denmark is ready to contribute to the EU’s reduction target of at least 40 per cent by 2030 (compared with 1990 levels) by taking on an ambitious 2030 targets for reducing emissions outside the quota system. In October 2017 Denmark agreed to a reduction in non-ETS emissions in the period 2021-2030, rising to 39% by 2030 relative to 2005, when the flexible mechanisms of the Effort Sharing Regulation are taken into account. The final approval by the European Parliament is still pending. In 2018, the government will prepare a cost-effective strategy for meeting Denmark's reduction target in 2030. The Government will among other things include recommendations from the Danish Climate Council. The EU has a target of 27 per cent renewable energy by 2030. This target has already been met by Denmark. Denmark will go further than that. The Government will therefore pursue a target of at least 50 per cent of Denmark’s energy needs to come from renewable sources by 2030.

The Government will evaluate the objective of phasing in of renewable energy with appropriate intervals (stock-taking). Evaluations will in particular take stock of the speed in market maturation of renewable energy technologies and the development in comparable prices for different forms of energy. In connection with the evaluations it should be decided whether renewable energy should be phased in more quickly. The opposite could also be the case, if the expected developments in technologies and prices are absent.

This new goal is to ensure that Denmark maintains a high speed in the green transition so that the goals for 2050 can be reached in a manner which is as cost effective as possible. The Government’s long-term goal for Denmark in 2050 is a low-emission society independent of fossil fuels. The Danish long-term 2050 goal is to ensure that Denmark complies with the EU's target of 80-95 per cent reduction of greenhouse gases by 2050.

The Government will in 2018 make proposals for a new broad energy agreement after 2020, partly on the basis of the national Energy Commission's work. A new energy agreement aims to ensure the continued transformation of the energy sector.

Denmark is in a unique position to continue expanding with offshore wind. The costs of offshore wind power have fallen sharply in recent years. The Government's aim is that Denmark will be the first country in the world where offshore wind can survive on market conditions. In order to ensure a decision basis for a continued expansion, the government will launch a screening of the North Sea and the Baltic Sea for possible locations for additional offshore wind.

The electricity market must be further developed and the support systems for renewable energy must be harmonized. As part of the electrification of the energy system, the Government will promote heat pumps and utilize surplus. Furthermore, the Government will analyse barriers for electricity storage.

Future flexible energy market requires joint planning of energy and flexibility on both the supply and demand side. The Government will prepare an action plan for smart energy, including focusing on the opportunities that digitization brings.

As stated in the Government Platform, the Danish energy system could become the most innovative, efficient and forward-thinking in the world. It requires that the Danish energy research continuously is the absolute world elite. The Government will therefore strengthen the Danish energy research and actively exploit cooperation in Mission Innovation Initiative.

As also stated in the Government Platform, the Government will implement the political agreement on the introduction of a blending requirement of 0.9 per cent advanced biofuels in fuel for land transport.

International focus
To ensure international progression in the green transition is a key foundation for the government's climate policy. This is done via the EU, focusing on the establishment of ambitious goals and policies in the Community and an ambitious global, international climate effort, including under the auspices of the UN and through bilateral cooperation.

Denmark wants to actively contribute to the EU's climate efforts.

As laid out in Government Platform, the government has been working actively to ensure structural reforms of the European Emission Trading Scheme (ETS), which can reduce the amount of allowances, so that there are more consistent and clear price signals in the future - within and outside the quota sector for the benefit of the green transition.

*4.1.2.2 **The 2012 agreement on Danish energy policy 2012-2020***

As a follow-up on the 2011 energy plan a political agreement was reached on 22 March 2012 on Danish energy policy for the years 2012-2020.

The elements in the 2012 Energy Agreement are described in greater detail below.

The most ambitious energy plan in the world

The 2012 Energy Agreement contains a wide range of ambitious initiatives, bringing Denmark a good step closer to the target by 2050.

The Agreement will lead to large investments up to 2020 in energy efficiency, renewable energy and the energy system. Results in 2020 include approximately 50% of electricity consumption supplied by wind power, and more than 35% of final energy consumption supplied from renewable energy sources.

Denmark in 2020 – results of the Energy Agreement

The long-term goal is to be independent of fossil fuels by 2050.

Only by improving energy efficiency, electrifying Danish energy consumption, and expanding supply from renewables, will it be possible to phase out fossil fuels completely. The initiatives in Denmark's Energy Agreement for the period 2012–2020 cover these crucial areas.

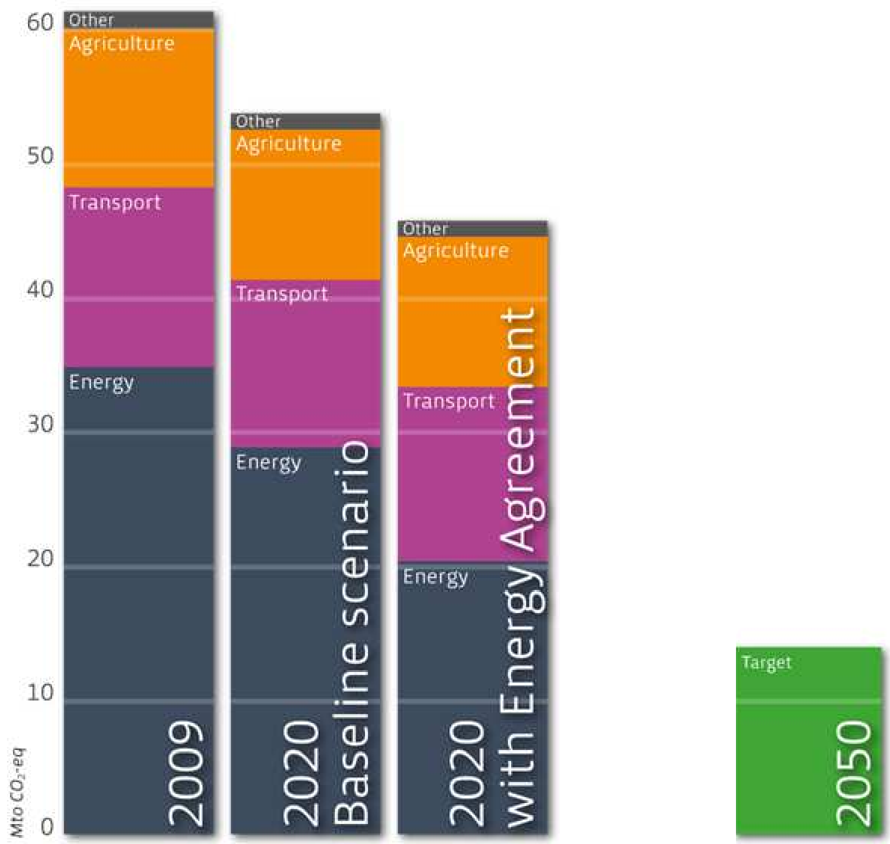
These are the 2012 Energy Agreement's headline results for 2020:

- More than 35% renewable energy in final energy consumption.
- Approximately 70% of electricity consumption to be supplied by renewable energy sources in total and about 50% of electricity consumption to be supplied by wind power.
- Approximately 8% reduction in gross energy consumption in relation to 2010.
- 34% reduction in greenhouse gas emissions in relation to 1990.

Consequently, in 2020 Danish enterprises and households will be significantly less dependent on scarce and expensive fossil fuels (see Figure 4.1).

FIGURE 4.1: TOTAL DANISH GREENHOUSE GAS EMISSIONS (WITHOUT LULUCF) IN MILLION TONNES CO_2-EQUIVALENT IN 2009 AND 2020* AND DOMESTIC TARGETS IN 2020 AND 2050

Source: Ministry of Climate, Energy and Building



* The April 2011 Baseline scenario.

A more energy efficient Denmark

A crucial element in the transition to a low-emission society independent of fossil fuels will be that Denmark uses less energy by switching to more energy efficient technologies. Otherwise, economic growth will push up energy consumption and make it disproportionally expensive to expand the share of renewables in the energy supply. Moreover, investment in more energy efficient technology will often quickly pay itself back.

It is important to invest in retrofitting buildings. Extensive retrofitting is only carried out a few times in the life span of a building.

Initiatives in the 2012 Energy Agreement to make energy consumption more efficient:

- In 2013 and 2014, energy savings realised by energy companies have to increase by 2.6% of final energy consumption excl. transport compared to the 2010 level. From 2015 to 2020 this figure will rise to an annual 2.9% compared to the level in 2010. In comparison, the EU's Energy Efficiency

Directive suggests a yearly reduction up to 2020 of 1.5% of 2010 final energy consumption excl. transport. Energy companies are obliged to realise energy savings in enterprises and households by offering subsidies or consultancy, for example. The initiatives will target industry and buildings.

- A comprehensive strategy for energy retrofitting of all Danish buildings will be presented in 2013.
- The efforts by the Knowledge Centre for Energy Savings in Buildings will continue.

As a result of these and other initiatives, Danish gross energy consumption will decrease by approximately 8% in 2020 in relation to 2010 (see Figure 4.2).

FIGURE 4.2: DEVELOPMENT IN GROSS ENERGY CONSUMPTION (PJ) 2010-2020*
Source: Ministry of Climate, Energy and Building

* The April 2011 Baseline scenario.

Wind power and new energy technologies

Denmark has sufficient renewable energy resources to satisfy energy consumption in the long term. The Energy Agreement ensures a substantial expansion of wind power in particular, corresponding to the annual electricity consumption of 1½ million households (see Figures 4.3, 4.5 and 4.6). Consequently, approximately 50% of Danish electricity consumption is expected to be covered by wind power in 2020. In comparison, the share was 2% in 1990 and 28% in 2011.

Initiatives in the 2012 Energy Agreement to expand renewable energy production:

- 600 MW offshore wind turbines at Kriegers Flak and 400 MW offshore wind turbines at Horns Rev.
- 500 MW offshore wind turbines in coastal areas.
- New planning tools will encourage an increase in net capacity of 500 MW onshore wind power. This will entail increasing electricity production from onshore turbines, despite the decommissioning of older turbines.

In order to transform the energy system intelligently and cost-effectively, continuous research, development and testing of new technological solutions is needed. Initiatives in the 2012 Energy Agreement include:

- DKK 60 million has been committed to funding the development and use of new renewable energy technologies for electricity production (solar, wave power, etc.)
- DKK 35 million has been committed to funding the development and use of new renewable energy technologies in district heating (large heat pumps, geothermal energy, etc.)
- DKK 9.5 million has been committed to the project to make the island of Samsø independent of fossil fuels.

The parties behind the Energy Agreement stress that efforts to uphold a high level of research, development and demonstration in green energy technology in areas with commercial and growth potential should be maintained. Investing in new green technologies contributes to building Denmark's future prosperity.

FIGURE 4.3: SHARE OF WIND POWER IN ELECTRICITY CONSUMPTION 2010-2020*

Source: Ministry of Climate, Energy and Building

* The April 2011 Baseline scenario.

Renewable energy in industry, buildings and transport

Consumption by industrial processes is also to be converted to renewable energy. Therefore, the Energy Agreement has laid down the following:

- A new green business scheme of DKK 250 million in 2013 and DKK 500 million per year from 2014 to 2020 will promote the efficient use of renewable energy in enterprises.
- DKK 30 million per year from 2013 to 2020 has been committed to maintaining and promoting industrial CHP in industry and greenhouses.

The Energy Agreement contains a number of initiatives which will reduce individual heating based on oil and gas in buildings substantially and promote renewable alternatives:

- A halt to installation of oil-fired and gas-fired boilers in new buildings from 2013
- A halt to installation of oil-fired boilers in existing buildings from 2016 in areas with district heating or natural gas
- DKK 42 million has been committed to fund the conversion from oil-fired and gas-fired boilers in existing buildings to renewable alternatives (solar, heat pumps, etc.)
- A comprehensive analysis of the future alternative use of the gas infrastructure will be presented in 2013.

Today, the Danish transport sector runs almost entirely on fossil fuels. Conversion to renewable energy in transport is a tremendous challenge. In the longer term, electric cars will be important. In the short term biofuels will play a role. Initiatives in the 2012 Energy Agreement to promote the green transition in the transport sector are:

- DKK 70 million to establish more recharging stations for electric cars and to promote the infrastructure for hydrogen cars, etc.
- A strategy for the promotion of energy efficient vehicles.
- Fuels must contain 10% renewable energy in 2020.
- DKK 15 million to continue the pilot scheme for electric cars.

As a result of the initiatives in the Energy Agreement, Denmark's total use of oil, coal and gas is expected to be reduced by approximately 25% in 2020 in relation to 2010 (see Figure 4.4).

FIGURE 4.4: TOTAL CONSUMPTION OF OIL, COAL AND GAS (PJ) 2010-2020*

Source: Ministry of Climate, Energy and Building

* The April 2011 Baseline scenario.

Bioenergy in Danish energy supply

Biomass is an important replacement for coal. In the long term, biomass will also be a vital element for flexible electricity production and for the transport sector. Initiatives in the Energy Agreement to increase the consumption of biomass include:

- Conversion from coal to biomass at large-scale CHP plants will be made more attractive by allowing producers and consumers to make price agreements.

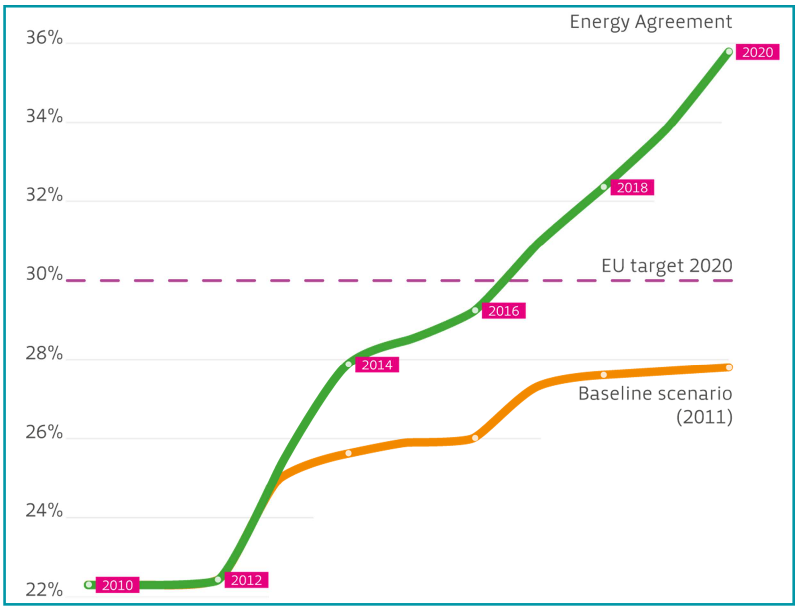
- Smaller open-field plants struggling with high heating prices can now produce heating based on biomass.
- An analysis of the future role of district heating in the energy system will be presented in 2013.
- An analysis of the use of bioenergy in Denmark will be presented in 2013. The analysis will focus on the effective and sustainable use of the Danish biomass resources for energy purposes.

The Energy Agreement (2012) identified biogas as an important challenge for Denmark. Biogas is useful in the energy system, and the technology reduces environmental problems. The ambitious plan for biogas expansion is underpinned by the following initiatives in the Energy Agreement. The Energy Agreement is valid for the period from 2012 to 2020:

- Funding of biogas for CHP to continue.
- Introduction of subsidy equality so that biogas sold to the natural gas grid receives the same subsidy as biogas used at CHP plants.
- Introduction of a new subsidy when biogas is used in industrial processes or as a fuel for transport[1].
- Increase in the start-up aid for new biogas projects for 2012 only. In 2012 support was awarded to both new and existing biogas plants to the amount of DKK 262 million.
- A national task force has been established to support local authorities in the planning of new biogas plants.
- If the required number of new biogas projects is not realised in 2012 and 2013, the parties behind the Energy Agreement will discuss further options, e.g. a proposal making it compulsory to purchase biogas in order to secure expansion.

FIGURE 4.5: SHARE OF RENEWABLE ENERGY IN FINAL ENERGY CONSUMPTION 2010–2020*

Source: Ministry of Climate, Energy and Building



* The April 2011 Baseline scenario.

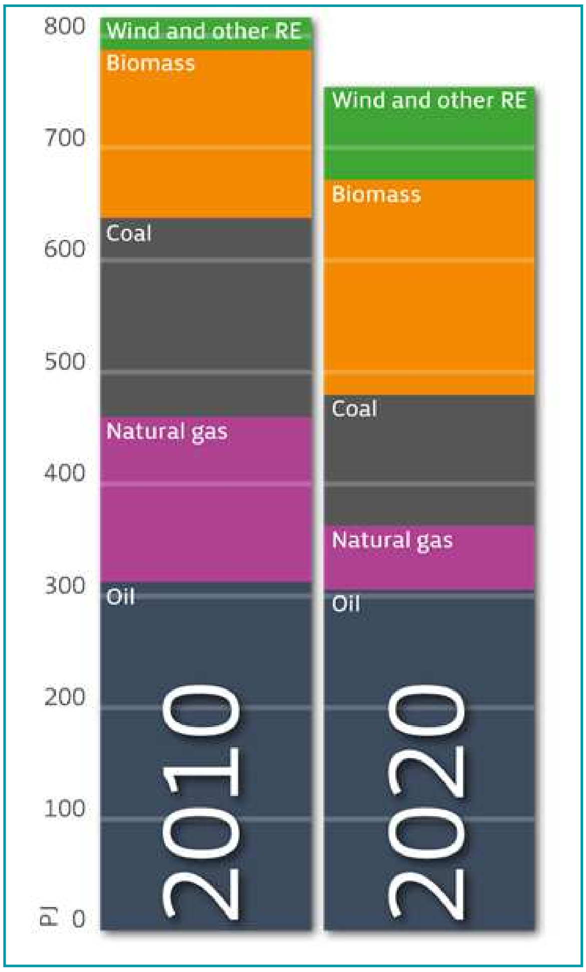
Smart grids

Due to the increasing share of wind power in the Danish energy system, electricity will be a main energy carrier in the future. However wind power is volatile and energy storage is still expensive. Consequently, initiatives in the Energy Agreement point towards transforming and future-proofing the energy system:

- A strategy for smart grids in Denmark was presented in 2012 and implemented through legislation in 2013.
- Agreements will be established with grid companies on the installation of intelligent, remotely readable hourly electricity meters.
- New electricity transmission lines between Denmark and Germany.
- A comprehensive analysis of the continued functionality of the grid with an increased share of wind power in the system will be presented in 2013.
- A thorough analysis of the regulation of the Danish electricity supply sector will be carried out to ensure cost effectiveness, competition and consumer protection.

FIGURE 4.6: CONSUMPTION OF FOSSIL FUELS AND RENEWABLE ENERGY (PJ) IN 2010 AND 2020*

Source: Ministry of Climate, Energy and Building



* The April 2011 Baseline scenario.

Financing the initiatives in the Energy Agreement

The Energy Agreement requires financing. The total financing requirement amounts to DKK 3.5 billion in 2020. The initiatives are to be fully financed and should not impact the general public finances. The Agreement thus stipulates the following:

- Energy saving initiatives by energy companies will be financed via the companies' tariffs and therefore through consumers' energy bills.
- The expansion of renewables in electricity production such as offshore and onshore wind turbines will be financed through the Public Service Obligation schemes (PSO) which are a supplement to the price of electricity paid by electricity consumers. In addition, a new gas PSO scheme is under way pending comments from the European Commission. The gas PSO will be collected through the gas bills and it will finance subsidies for renewable energy for the gas grid.
- As consumption of fossil fuels drops, state revenues from taxes on coal, oil and gas will also drop correspondingly. Therefore, a security of supply tax has been introduced on all fuels – biomass and fossil – for space heating. This new tax will also finance some of the subsidies for renewable energy which cannot be financed via the PSO schemes.

*4.1.2.3 **Denmark's climate policy – as part of the EU climate policy***

Danish climate policy is based on two pillars – the European and the national. As a small country with an open economy, it is clear that the more Denmark can implement climate policy with common European solutions, the better the total effect of climate policy and the easier it will be to maintain Danish competitiveness in relation to trading partners in the EU.

The EU is also a crucial player in international climate negotiations. The implementation of the Paris Agreement requires an ambitious common EU approach for the period after 2020. The need for a common EU approach was highlighted by the European Council in May 2013. The European Council has asked the European Commission to draw up specific proposals for a framework for EU climate and energy policy in 2030. In light of this, the Commission has put forward proposals for the concrete implementation of the ambitious climate and energy EU targets for the period after 2020. These proposals are now under consideration by the European Council or the European Parliament. This will follow up on the EU's 2008 Climate and Energy Package that established EU targets for 2020 of a 20% reduction in greenhouse gases compared with 1990, 20% renewable energy and 20% energy-efficiency improvements cf. Box 4.1.

4.2 LEGISLATIVE ARRANGEMENTS AND ENFORCEMENT AND ADMINISTRATIVE PROCEDURES

The legal basis for the division of powers into the legislative, executive, and judicial power is the Danish Constitution, *Danmarks Riges Grundlov*[2].

The Constitution includes the legal basis for how the Regent acts on behalf of the Realm in international affairs, and the Regent cannot act without the consent of the Folketing in any way that increases or restricts the area of the Realm, or enter into obligations requiring cooperation of the Folketing or which in some other way are of great significance to the Realm. Neither can the Regent, without the consent of the Folketing, cancel an international agreement entered into with the consent of the Folketing.

After a motion from the government, the Folketing thus gave its consent in 2002, allowing Her Majesty Queen Margrethe the Second, on behalf of the Realm and with territorial reservations for the Faroe Islands, to ratify the Kyoto Protocol. This was on 31 May 2002.

Denmark's implementation of the Kyoto Protocol in the first commitment period 2008-2012 has been effectuated by following up on the national Climate Strategy, sector-policy strategies with climate considerations, and concrete initiatives contributing to limiting or reducing greenhouse gas emissions, and implementation of the other parts of the Kyoto Protocol. The legislation necessary to do this has been adopted in pursuance of the Constitution regulations concerning legislative powers.

Pursuant to the Constitution, the Regent is the ultimate authority, cf. paragraphs 12-14:

"12. Subject to the limitations laid down in this Constitutional Act, the King shall have supreme authority in all the affairs of the Realm, and shall exercise such supreme authority through the Ministers.

13. The King shall not be answerable for his actions; his person shall be sacrosanct. The Ministers shall be responsible for the conduct of government; their responsibility shall be defined by statute.

14. The King shall appoint and dismiss the Prime Minister and the other Ministers. He shall decide upon the number of Ministers and upon the distribution of the duties of government among them. The signature of the King to resolutions relating to legislation and government shall make such resolutions valid, provided that the signature of the King is accompanied by the signature or signatures of one or more Ministers. A Minister who has signed a resolution shall be responsible for the resolution."

With this background, the Regent delegates responsibility for various functions to government ministers through Royal resolutions. This makes the various ministers for different areas responsible for, e.g. making proposals for new/amended legislation made necessary by the Kyoto Protocol, enforcement of legislation and initiation of necessary administrative procedures.

The total set of regulations (in Danish) can be accessed via Retsinformation[3] (online legal information system). Legislation concerning measures of importance to Denmark's commitments under the Kyoto Protocol will be enforced pursuant to the current legal basis, including pursuant to any penalty clause. Enforcement could also involve the judicial power.

As regards the institutional arrangements for the implementation the Kyoto Protocol concerning activities in connection with participation in the mechanisms under Articles 6, 12, and 17 of the Kyoto Protocol, these tasks have been delegated to the Danish Energy Agency (DEA) under the Ministry of Energy, Utilities and Climate.

The DEA is also responsible for legislation and administration of the EU emission trading scheme. The supplementary regulations regarding the approval and use of JI/CDM credits and the Registry are now regulated in Statutory Order No. 118 dated 28 February 2008 with later amendments (https://www.retsinformation.dk/Forms/R0710.aspx?id=144489).

Among the national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and the elected activities under Article 3, paragraph 4, also contribute to the conservation of biodiversity and sustainable use of natural resources is The Forest Act (Consolidating Act No. 122 of 26 January 2017), and the implementation thereof by the Danish Environmental Protection Agency under the Ministry of Environment and Food. Preservation of areas designated as forest reserve land and protection of natural habitats and habitats for species are among the foremost objectives of the Forest Act.

Furthermore, activities under Article 3, paragraph 3, and the elected activities under Article 3, paragraph 4 have to be implemented in accordance with Natura 2000, which are the Special Areas of Conservation (SAC) designated according to the European Union's Habitats Directive and the Special Protection Areas (SPA) designated according to the European Union's Birds Directive. The Danish Ramsar Sites are included in the Special Protection Areas.

The Danish Environmental Protection Agency, under the Ministry of Environment and Food of Denmark, has the overall responsibility for the implementation of the Habitats Directive and the Birds Directive. The implementation includes the designation of 262 Special Area of Conservation, 113 Special Protection Areas and 28 Ramsar Sites. The rules for administration of the Danish Natura 2000 are laid down in Executive Order No. 926 of 27 January 2016 on the Designation and Administration of Internationally Protected Sites and the Protection of Certain Species. Similar rules are integrated in other ministries legislation i.g fisheries and constructions in marine areas.

4.3 POLICIES AND MEASURES AND THEIR EFFECTS

In this section, the individual measures relevant to Denmark's climate policy are described. An overview of Denmark's portfolio of climate relevant policies and measures is contained in Annex B1.

Sections 4.3.1-4.3.4 includes descriptions of the cross-sectoral policies and measures, allowance regulation, the Kyoto Protocol mechanisms, taxes and duties and the national green climate fund. Sections 4.3.5-4.3.9 contains descriptions of policies and measures in the following IPCC source/sink and sector categories: Energy (including Transport), Industrial Processes and Product Use, Agriculture, LULUCF (Land-use, Land-use change and Forestry) and Waste.

Table 4.1 shows how the allocation to be used in connection with the annual emission inventories (the CRF/IPCC format) is aggregated into the sectors included in this Chapter on policies and measures and in Chapter 5 on projections.

TABLE 4.1 AGGREGATION OF SOURCE, SINK AND SECTOR CATEGORIES IN THE CRF/IPCC FORMAT INTO THE SECTORS INCLUDED IN THIS CHAPTER AND CHAPTER 5

Sectors in this chapter and Chapter 5	Sources/Sectors in the CRF/IPCC format	
Energy - with subsections on:	1.	Fuel combustion activities (1A) and Fugitive emissions from fuels (1B)
Business	1A2+ 1A4a+ 1A4c.	Manufacturing Industries and Construction Commercial/Institutional Agriculture, Forestry and Fisheries
Households	1A4b	Residential
Transport	1A3.	Transport (national)
Industrial Processes and Product Use	2.	Industrial processes and Product Use
Agriculture	3.	Agriculture
LULUCF	4.	Land-use, Land-use Changes and Forestry (LULUCF).
Waste	5.	Waste

Table 4.2 and Figure 4.8 show the main result of this aggregation, including indirect CO_2 emissions, for the historic greenhouse gas inventories in 1990, KP2 base year estimate for 1990/95[4] and 2015 as well as the March 2017 projections of annual emissions in 2020, 2025, 2030 and 3035 – with and without emissions and removals in connection with land use, land-use change and forestry (LULUCF)[5].

In accordance with the reporting guidelines, the following sector sections in this chapter are subdivided by gas.

Regarding the greenhouse-gas-reducing effects of measures, a major ex-post analysis of Denmark's efforts in 1990-2001 to reduce emissions of CO_2 and other greenhouse gases, and associated costs was finalised and published in March 2005 in the report, “Denmark's CO_2 emissions - the effort in the period 1990-2001 and the associated costs”[6], hereafter *the Effort Analysis*. The results of the *Effort Analysis* are described in Annex B2.

Prior to this analysis, quantitative estimates of the effect of separate measures on greenhouse gas emissions were often limited to ex-ante estimates before the measure in question was adopted. In a few cases, the implementation of a measure was followed by an ex-post evaluation. A major reason that only a few ex-post evaluations of individual measures have been carried out is that it is often difficult to clearly attribute an observed greenhouse gas reduction to a particular measure, since many areas (sectors/sources) are affected by several measures at the same time.

In the analysis of the importance of selected, implemented measures for greenhouse gas emissions as a result of efforts in 1990-2001, the effect and cost of a number of measures were estimated - both for the year 2001 and for the period 2008-2012. Thus, the latter case is a so-called without measures projection i.e. without the effects of measures implemented since 1990, which gives estimates of the size of mean annual greenhouse gas emissions in 2008-2012, if the measures until 2001 had not been implemented.

Please note that the statistical base for *the Effort Analysis* has included the emissions inventory submitted to the EU and the UN in 2003 (covering 1990-2001) and the “with measures” baseline projection (2008-2012), i.e. without additional measures, published in February 2003 together with the Climate Strategy of the government in 2003.

In December 2013 the Ministry of Climate, Energy and Building published a paper with another ex-post analysis in response to recommendations in a report published by the National Audit Office in October 2012. This paper contains an evaluation of the effects of certain climate change mitigation measures selected by the National Audit Office. A translation of this paper is contained in Annex B3.

In December 2015 estimates of the total effect of the group of policies and measures that promote the use of renewable energy (RE-PAMs) and of the total effect of the group of policies and measures that promote energy efficiency (EE-PAMs) were elaborated. In December 2017 these estimates were updated on the basis of the most recent energy statistics covering the period 1990-2016 and the March 2017 "with measures" projection covering the period until 2035 The methodologies and the results are further described in Annex B4.

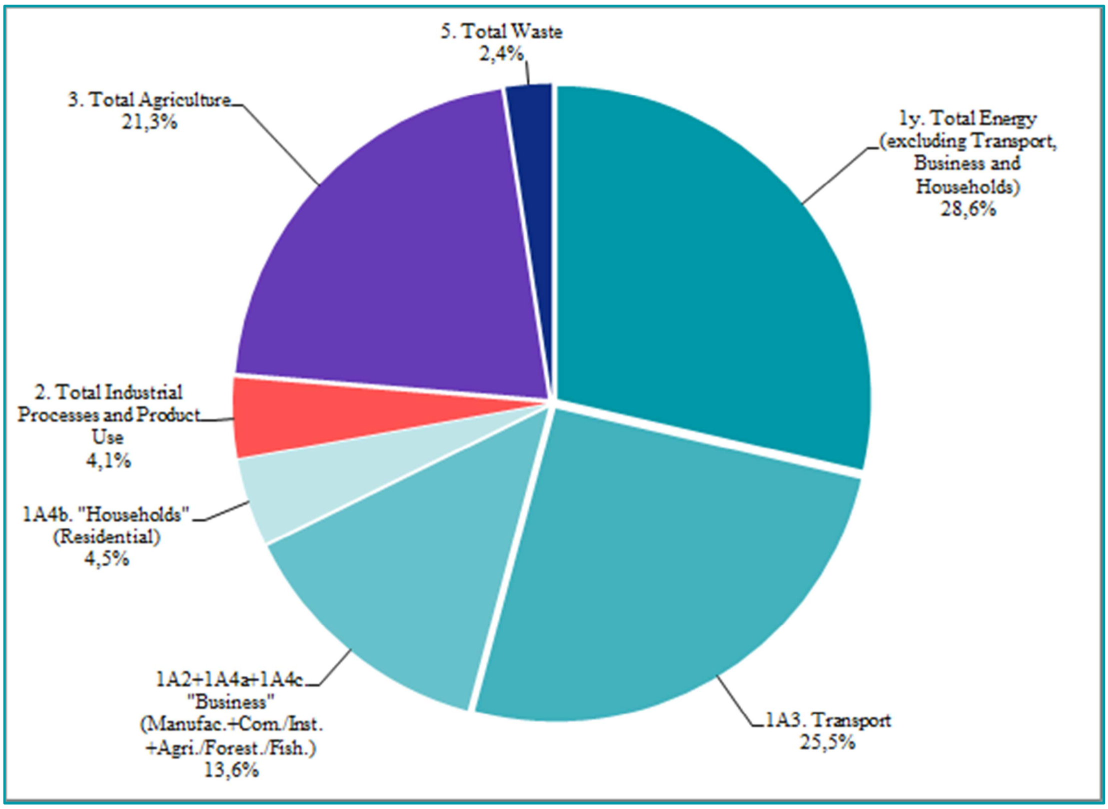
TABLE 4.2 DENMARK'S GREENHOUSE GAS EMISSIONS 1990-2015, THE BASE YEAR UNDER THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL AND THE MAIN RESULTS OF THE MARCH 2017 "WITH (EXISTING) MEASURES" (WEM) PROJECTION FOR 2020, 2025, 2030 AND 2035 BY SECTOR AND BY GAS (INCLUDING INDIRECT CO2 AND THE ESTIMATED EFFECTS OF BIOCOVERS ON OLD LANDFILLS , BUT WITHOUT THE POSSIBLE EFFECTS OF ELECTRICITY TRADE)

Source: Nielsen et al. (2017, in prep.) and the Danish Ministry of Energy, Utilities and Climate

GHG emissions (1990-2015) and projections (2016-2035)	1990 MtCO2e	1990 % share for/in sector	KP2 BY MtCO2e	KP2 BY % share for/in sector	2015 MtCO2e	2015 % share for/in sector	Change from 1990 (%)	Change from KP2 BY	2020 MtCO2e	2020 % share for/in sector	Change from 1990 (%)	Change from KP2 BY	2025 MtCO2e	2025 % share for/in sector	Change from 1990 (%)	2030 MtCO2e	2030 % share for/in sector	Change from 1990 (%)	2035 MtCO2e	2035 % share for/in sector	Change from 1990 (%)
Total (including LULUCF)	**75,3**	***107,0***	**70,8**	***100,0***	**52,5**	***108,6***	**-30,3**	**-25,9**	**43,5**	***97,8***	**-42,2**	**-38,6**	**46,9**	***96,8***	**-37,6**	**49,4**	***97,4***	**-34,3**	**46,9**	***95,7***	**-37,7**
CO2	59,7	*84,8*	54,8	*77,4*	39,6	*82,0*	-33,6	-27,7	31,6	*71,0*	-47,1	-42,4	35,1	*72,4*	-41,2	37,7	*74,3*	-36,8	35,1	*71,7*	-41,1
Methane	7,6	*10,9*	7,9	*11,1*	6,9	*14,3*	-9,6	-12,2	6,0	*13,5*	-21,6	-23,8	6,1	*12,6*	-20,0	6,1	*12,1*	-19,7	6,1	*12,5*	-19,7
Nitrous oxide	7,9	*11,2*	7,8	*11,0*	5,2	*10,8*	-34,1	-33,1	5,4	*12,2*	-31,3	-30,3	5,5	*11,3*	-30,5	5,5	*10,8*	-30,9	5,5	*11,2*	-30,7
Industrial gases	0,0	*0,1*	0,3	*0,5*	0,7	*1,5*	1649,6	115,4	0,5	*1,1*	1013,6	37,1	0,2	*0,5*	453,5	0,1	*0,3*	231,8	0,1	*0,3*	200,0
Total (excluding LULUCF)	**70,4**	***100,0***	**70,8**	***100,0***	**48,3**	***100,0***	**-31,3**	**-31,7**	**44,5**	***100,0***	**-36,8**	**-37,2**	**48,5**	***100,0***	**-31,1**	**50,7**	***100,0***	**-27,9**	**49,0**	***100,0***	**-30,3**
CO2	54,8	*77,9*	54,8	*77,4*	35,6	*73,6*	-35,1	-35,1	32,7	*73,5*	-40,4	-40,3	36,8	*75,8*	-32,9	39,0	*76,9*	-28,8	37,3	*76,1*	-32,0
Methane	7,6	*10,8*	7,9	*11,1*	6,8	*14,2*	-10,2	-12,9	5,9	*13,3*	-22,3	-24,7	6,0	*12,5*	-20,7	6,1	*12,1*	-19,5	6,1	*12,5*	-19,5
Nitrous oxide	7,9	*11,2*	7,8	*11,0*	5,2	*10,7*	-34,3	-33,6	5,4	*12,1*	-31,5	-30,8	5,5	*11,3*	-30,8	5,5	*10,8*	-30,7	5,5	*11,2*	-30,5
Industrial gases	0,0	*0,1*	0,3	*0,5*	0,7	*1,5*	1649,6	115,4	0,5	*1,1*	1013,6	37,1	0,2	*0,5*	453,5	0,1	*0,3*	231,8	0,1	*0,3*	200,0
1. Total Energy	**53,6**	***76,2***	**53,6**	***75,7***	**34,9**	***72,2***	**-34,9**	**-34,9**	**31,7**	***71,4***	**-40,8**	**-40,8**	**35,7**	***73,6***	**-33,4**	**37,8**	***74,5***	**-29,5**	**36,0**	***73,5***	**-32,8**
CO2 (with all indirect CO2 here and no electricity trade after 2015)	52,9	*98,6*	52,9	*98,6*	34,1	*97,8*	-35,5	-35,4	31,1	*97,8*	-41,3	-41,3	35,0	*97,9*	-33,9	37,1	*98,2*	-29,8	35,4	*98,2*	-33,2
Methane	0,4	*0,7*	0,4	*0,7*	0,4	*1,0*	0,2	0,1	0,3	*1,0*	-10,4	-10,4	0,3	*1,0*	-5,6	0,3	*0,8*	-13,9	0,3	*0,8*	-23,2
Nitrous oxide	0,4	*0,7*	0,4	*0,7*	0,4	*1,1*	7,9	7,4	0,4	*1,1*	0,8	0,4	0,4	*1,1*	8,4	0,4	*1,0*	5,7	0,4	*1,1*	5,1
2. Total Industrial Processes and Product Use	**2,3**	***3,3***	**2,6**	***3,7***	**2,0**	***4,1***	**-15,0**	**-24,7**	**1,9**	***4,3***	**-18,5**	**-27,8**	**1,8**	***3,8***	**-21,3**	**1,8**	***3,6***	**-22,2**	**1,9**	***3,8***	**-20,8**
CO2	1,3	*54,5*	1,3	*48,3*	1,2	*61,6*	-4,1	-3,9	1,4	*74,1*	10,8	10,9	1,6	*86,1*	24,2	1,7	*91,1*	30,0	1,7	*92,0*	33,6
Methane	0,0	*0,1*	0,0	*0,1*	0,0	*0,2*	59,6	59,6	0,0	*0,2*	29,3	29,3	0,0	*0,2*	29,3	0,0	*0,2*	29,3	0,0	*0,2*	29,3
Nitrous oxide	1,0	*43,6*	1,0	*38,6*	0,0	*1,0*	-98,1	-98,1	0,0	*1,0*	-98,1	-98,1	0,0	*1,0*	-98,1	0,0	*1,0*	-98,1	0,0	*1,0*	-98,1
Industrial gases	0,0	*1,8*	0,3	*13,0*	0,7	*37,3*	1649,6	115,4	0,5	*24,7*	1013,6	37,1	0,2	*12,7*	453,5	0,1	*7,7*	231,8	0,1	*6,9*	200,0
3. Total Agriculture	**12,6**	***18,0***	**12,8**	***18,1***	**10,3**	***21,3***	**-18,5**	**-19,4**	**10,6**	***23,7***	**-16,4**	**-17,4**	**10,6**	***21,9***	**-15,9**	**10,7**	***21,1***	**-15,3**	**10,7**	***21,8***	**-15,3**
CO2	0,6	*4,9*	0,6	*4,8*	0,2	*1,7*	-71,3	-71,3	0,2	*1,9*	-67,7	-67,7	0,2	*1,8*	-68,4	0,2	*1,8*	-68,9	0,2	*1,8*	-68,9
Methane	5,6	*44,2*	5,8	*45,6*	5,5	*53,6*	-1,1	-5,1	5,5	*52,4*	-0,9	-5,0	5,6	*52,6*	0,1	5,7	*53,0*	1,5	5,7	*53,0*	1,5
Nitrous oxide	6,4	*50,9*	6,3	*49,6*	4,6	*44,6*	-28,5	-27,5	4,8	*45,7*	-24,9	-23,9	4,8	*45,5*	-24,7	4,8	*45,2*	-24,7	4,8	*45,2*	-24,8
5. Total Land-Use Categories (LULUCF)	**4,9**	***7,0***	**0,0088**	***0,0***	**4,2**	***8,6***	**-15,3**	-	**-1,0**	***-2,2***	**-120,3**	-	**-1,6**	***-3,2***	**-131,9**	**-1,3**	***-2,6***	**-126,9**	**-2,1**	***-4,3***	**-143,5**
CO2 (for KP2 BY only GHG emissions from deforestation)	4,9	*99,1*	0,0088	*100,0*	4,1	*97,7*	-16,4	-	-1,1	*110,4*	-122,6	-	-1,7	*106,9*	-134,4	-1,3	*100,2*	-127,2	-2,1	*100,1*	-143,9
Methane	0,0	*0,4*	0,0	*0,0*	0,1	*1,5*	218,6	-	0,1	*-6,8*	258,6	-	0,1	*-4,5*	274,0	0,0	*0,0*	-100,0	0,0	*0,0*	-100,0
Nitrous oxide	0,0	*0,6*	0,0	*0,0*	0,0	*0,8*	24,4	-	0,0	*-3,5*	28,5	-	0,0	*-2,3*	32,9	0,0	*-0,2*	-89,0	0,0	*-0,1*	-89,0
5. Total Waste	**1,8**	***2,5***	**1,8**	***2,5***	**1,2**	***2,4***	**-34,6**	**-34,7**	**0,3**	***0,6***	**-84,8**	**-84,9**	**0,3**	***0,7***	**-81,1**	**0,4**	***0,8***	**-77,8**	**0,4**	***0,9***	**-74,8**
CO2	0,0	*1,0*	0,0	*1,0*	0,0	*1,8*	21,3	21,3	0,0	*7,0*	6,2	6,2	0,0	*5,6*	6,2	0,0	*4,8*	6,2	0,0	*4,2*	6,2
Methane (here including the estimated effects of biocovers)	1,7	*94,8*	1,7	*94,8*	1,0	*82,9*	-42,9	-42,9	0,1	*22,3*	-96,4	-96,4	0,1	*32,2*	-93,6	0,1	*37,9*	-91,1	0,2	*41,1*	-89,1
Nitrous oxide	0,1	*4,2*	0,1	*4,2*	0,2	*15,3*	139,0	138,1	0,2	*70,7*	156,8	155,8	0,2	*62,2*	181,2	0,2	*57,4*	205,5	0,2	*54,7*	229,5
1x. Total Energy (excluding Transport)	**42,9**	***61,0***	**42,9**	***60,6***	**22,6**	***46,7***	**-47,4**	**-47,4**	**19,4**	***43,7***	**-54,7**	**-54,7**	**23,5**	***48,5***	**-45,2**	**25,8**	***50,8***	**-39,8**	**24,5**	***50,0***	**-42,8**
CO2 (with all indirect CO2 here and no electricity trade after 2015)	42,3	*98,7*	42,3	*98,7*	21,9	*97,3*	-48,1	-48,1	18,9	*97,2*	-55,4	-55,4	22,9	*97,5*	-45,8	25,3	*97,9*	-40,3	24,0	*97,9*	-43,2
Methane	0,3	*0,7*	0,3	*0,7*	0,4	*1,6*	15,1	15,1	0,3	*1,6*	3,8	3,8	0,3	*1,4*	9,6	0,3	*1,2*	-0,1	0,3	*1,1*	-11,1
Nitrous oxide	0,3	*0,6*	0,3	*0,6*	0,3	*1,1*	-1,9	-2,6	0,2	*1,1*	-14,8	-15,4	0,2	*1,0*	-5,9	0,2	*0,9*	-10,7	0,2	*0,9*	-11,1
1A3 Transport	**10,7**	***15,3***	**10,7**	***15,2***	**12,3**	***25,5***	**14,9**	**14,9**	**12,3**	***27,7***	**14,8**	**14,8**	**12,2**	***25,1***	**13,6**	**12,0**	***23,7***	**12,1**	**11,5**	***23,4***	**7,1**
CO2	10,6	*98,5*	10,6	*98,5*	12,2	*98,8*	15,3	15,3	12,2	*98,8*	15,1	15,1	12,0	*98,7*	13,9	11,9	*98,7*	12,3	11,3	*98,7*	7,2
Methane	0,1	*0,5*	0,1	*0,5*	0,0	*0,1*	-80,7	-80,7	0,0	*0,1*	-87,1	-87,0	0,0	*0,1*	-88,4	0,0	*0,1*	-88,4	0,0	*0,1*	-89,0
Nitrous oxide	0,1	*0,9*	0,1	*0,9*	0,1	*1,1*	33,0	33,4	0,1	*1,2*	41,1	41,5	0,1	*1,2*	45,5	0,1	*1,2*	48,3	0,1	*1,3*	47,0
1y. Total Energy (excluding Transport, Business and Households)	**28,2**	***40,0***	**28,2**	***39,8***	**13,8**	***28,6***	**-50,9**	**-50,9**	**11,8**	***26,5***	**-58,1**	**-58,1**	**15,7**	***32,3***	**-44,4**	**17,9**	***35,2***	**-36,5**	**16,4**	***33,6***	**-41,6**
CO2 (with all indirect CO2 here and no electricity trade after 2015)	27,9	*99,0*	27,9	*99,0*	13,5	*97,7*	-51,5	-51,5	11,5	*97,5*	-58,8	-58,8	15,3	*97,7*	-45,1	17,6	*98,2*	-37,0	16,1	*98,2*	-42,1
Methane	0,1	*0,5*	0,1	*0,5*	0,2	*1,4*	33,2	33,2	0,2	*1,6*	37,8	37,8	0,2	*1,4*	59,7	0,2	*1,2*	47,3	0,2	*1,1*	31,7
Nitrous oxide	0,1	*0,5*	0,1	*0,5*	0,1	*0,9*	-9,5	-9,3	0,1	*0,9*	-24,2	-24,0	0,1	*0,8*	-8,2	0,1	*0,6*	-17,1	0,1	*0,7*	-18,4
1A2+1A4a+1A4c: "Business" (Manufac.+Com./Inst.+Agri./Forest./Fish.)	**9,6**	***13,6***	**9,6**	***13,5***	**6,5**	***13,6***	**-31,6**	**-31,4**	**5,9**	***13,2***	**-38,5**	**-38,3**	**6,3**	***13,1***	**-33,7**	**6,7**	***13,1***	**-30,3**	**7,0**	***14,3***	**-26,9**
CO2	9,4	*98,6*	9,4	*98,5*	6,4	*98,1*	-32,0	-31,8	5,8	*98,4*	-38,6	-38,4	6,2	*98,4*	-33,8	6,6	*98,4*	-30,5	6,9	*98,4*	-27,0
Methane	0,0	*0,5*	0,0	*0,5*	0,1	*0,8*	13,0	12,5	0,0	*0,6*	-25,6	-25,9	0,0	*0,6*	-19,9	0,0	*0,6*	-16,9	0,0	*0,6*	-13,7
Nitrous oxide	0,1	*0,9*	0,1	*0,9*	0,1	*1,1*	-19,0	-20,9	0,1	*1,0*	-32,4	-34,0	0,1	*1,0*	-28,3	0,1	*1,0*	-25,9	0,1	*1,0*	-23,2
1A4b: "Households" (Residential)	**5,2**	***7,3***	**5,2**	***7,3***	**2,2**	***4,5***	**-58,0**	**-58,0**	**1,7**	***3,9***	**-66,4**	**-66,4**	**1,5**	***3,1***	**-71,1**	**1,3**	***2,5***	**-75,7**	**1,1**	***2,2***	**-79,1**
CO2	5,0	*97,1*	5,0	*97,1*	2,0	*92,2*	-60,1	-60,1	1,6	*91,6*	-68,3	-68,3	1,4	*91,5*	-72,8	1,1	*91,1*	-77,2	1,0	*91,1*	-80,3
Methane	0,1	*2,3*	0,1	*2,3*	0,1	*5,2*	-5,3	-5,3	0,1	*5,2*	-24,4	-24,4	0,1	*5,0*	-37,5	0,1	*4,8*	-49,3	0,0	*4,3*	-60,5
Nitrous oxide	0,0	*0,6*	0,0	*0,6*	0,1	*2,6*	79,5	79,5	0,1	*3,2*	75,6	75,6	0,1	*3,6*	66,5	0,1	*4,1*	60,0	0,0	*4,5*	54,7

FIGURE 4.8 DENMARK'S GREENHOUSE GAS EMISSIONS IN 2015 BY SECTOR

Source: Nielsen et al. (2017, in prep.) and the Danish Ministry of Energy, Utilities and Climate



4.3.1 Allowance regulation - Emission Trading Scheme

EU ETS 2005-2007

Directive 2003/87/EC on trading in CO_2 allowances (the EU ETS Directive) in 2005 introduced a greenhouse gas emissions allowance trading scheme in the EU. The objective of the allowance scheme is to reduce emissions of greenhouse gases so that the EU and its Member States can meet their reductions commitments under the Kyoto Protocol and the EU Burden-Sharing Agreement.

EU ETS 2008-2012

According to the EU ETS Directive, each Member State had to prepare a national allocation plan before the trading period 2008-12.

The European Commission approved the Danish National Allocation Plan (NAP2) in 2007. The NAP contained a detailed plan for the reduction efforts. In the NAP, the gap between the emission target and emission under business as usual amounted to 13 million tonnes CO_2 per year. Of this gap, 5.2 million tonnes CO_2 are covered by efforts in the emission trading sector, while the remaining 7.8 million tonnes CO_2 are covered by efforts in the non-emission trading sector using various instruments, including the use of CDM credits, sinks and additional domestic efforts. The NAP also ensures that Denmark honours the supplementarity principle.

Via the NAP, the allowance regulation in Denmark included individual emission limits 2008-2012 for CO_2 emissions from several sectors, which together produce approx. half of Denmark's total greenhouse gas emissions. Denmark allocated a total of 125 million CO_2 emission allowances during the five years of the scheme. Of these, 2.5 million have been allocated to new production units and major expansions. The rest have been allocated free of charge to those production units covered by the trading scheme in 2007.

In the following, only the principles and general figures for Denmark's implementation of the EU ETS Directive via NAP2 will be described.

From the 1 January 2008 the first Kyoto Commitment Period (CP1) commenced. In practice the EU ETS has not changed for the Danish operators under the EU ETS, even after the Community Independent Transaction Log and the registries under the EU ETS connected to the International Transaction Log under the UN on 28 October 2008, as the registry was already ready to work in the international emissions trading system.

Relevant key figures in the NAP for Denmark for the period 2008 – 2012 are shown in Table 4.3.

TABLE 4.3: KEY FIGURES IN THE PROPOSAL FOR DENMARK'S NATIONAL ALLOCATION PLAN 2008-12

Source: Denmark's National Allocation Plan 2008-12 (NAP2), 2007

	2003 emissions	Projected emissions 2008-12	Quota allocation 2008-12	Quota allocation 2005-07
	Million tonnes CO_2 equivalents per year			
Sectors subject to allowances, in total	36.6	29.7	24.5	33.5
- electricity & heat production	28.1	20.5	15.8	21.7
- other sectors subject to allowances, incl. offshore industries-	8.5	9.2	8.2	7.1
- auction			0	1.7
- new installations			0.5	1
Sectors not subject to allowances	*37.8*[1]	*38.1*		
Total	74.4	67.8		

[1] On the basis of the European Commission's broad definition of enterprises covered.

Denmark was committed to reducing its national greenhouse gas emissions by 21% in 2008-12, compared to 1990/1995 level. That meant that emissions had to be reduced to an average 54.8 million tonnes of CO_2 equivalents annually for the period.

In NAP2, the deficit between expected Danish emissions of CO_2 and the target Denmark was committed to achieving was expected to 13 million tonnes for the period 2008-12 if no further initiatives were implemented. The NAP documented how this deficit would be reduced to zero. As stated in NAP2, Denmark would meet its commitment through a combination of domestic and foreign environmental and energy measures by the government and by Danish enterprises with CO_2 emissions.

Denmark has had an active, environmentally oriented energy policy since the 1970s, and since 1990 this has been supplemented by an actual climate policy which, on an international scale, has entailed a major strain - economically and/or via administrative regulations - on most greenhouse gas emissions, especially from businesses and sectors not subject to allowances.

The period 2008 – 2012 was finalized in 2013 with the final surrendering of allowances and credits by companies participating under the EU ETS.

The final EU ETS accounting in Denmark for the period 2008-2012 shows that total verified CO_2 emissions under the EU ETS in Denmark were a little below the total amount of allocated allowances cf. Table 4.4. However, some companies have to some extent surrendered credits from JI and CDM projects and presumably instead sold or banked their surplus EU allowances.

TABLE 4.4: VERIFIED CO_2 EMISSIONS UNDER THE EU ETS IN DENMARK, FREE ALLOCATIONS AND SURPLUS/DEFICIT FOR THE PERIOD 2008-2012

Source: Danish Energy Agency, May 2013

	Verified CO_2 emissions under the EU ETS in Denmark 2008-2012						Free allocation	Excess of quotas (negative number represents a deficit)
	2008	2009	2010	2011	2012	Annual Average 2008-12	Annual Average 2008-12	Annual Average 2008-12
	Million tonnes CO_2						Million tonnes EUAs	Million tonnes EUAs
Central power plants	17.6	17.8	17.2	13.8	10.9	15.46	13.4	-2.06
Industry and Service	5.3	4.3	4.2	4.3	4.3	4.48	5.8	1.32
Offshore	2.0	1.8	1.9	1.7	1.7	1.82	2.3	0.48
Other electricity and heat production	1.6	1.6	2.0	1.6	1.4	1.64	2.4	0.76
Total stationary[1]	**26.5**	**25.5**	**25.3**	**21.5**	**18.2**	**23.4**	**23.9**	**0.5**
Aviation[2]			(1.5)	(1.4)	1.3	1.3	1.1	- 0.2

[1] In 2012, a total of 375 stationary installations were covered. Of these were 16 central power and heat plants, 111 manufacturing industries, 241 decentralized electricity and district heating plants and 7 offshore companies.

[2] In 2012, total CO_2 emissions from the 26 aircraft operators covered by the EU ETS in Denmark exceeded the free allocation of allowances for 2012. It should be noted that aviation emissions for 2012 cannot be compared with previous years, as aircraft operators in 2012 have been able to make use of the EU Commission's "stop- the-clock " decision. This decision, which applies only for 2012, gives an operator the opportunity to deduct CO_2 emissions related to flights in and out of the EU. Most operators chose to make use of this opportunity.

EU ETS 2013-2020

The EU Climate and Energy Agreement from December 2008 extended the ETS system to 2013-2020 in order for the EU to reduce CO_2-emissions by 20% in 2020. At the same time allocation was centralised and reduced, while auctioning is being/have been used more extensively since 2013.

Free allocation for stationary installations is carried out on the basis of benchmarks. These benchmarks reward best practice in low-emission production and are an important signal of the EU's commitment to moving towards a low-carbon economy.

Although auctioning is the default method for allocating emission allowances to companies participating in the EU ETS, the manufacturing industry continues to receive a share of free allowances until 2020 due to carbon leakage. The heat production also continues to receive free allowances – however declining from 80% of the benchmark in 2013 to 30% of the benchmark in 2020 for those not being exposed to carbon leakage.

The allowances for the installations in the EU ETS have been calculated for 2013-2020 in accordance with the EU benchmarking decision 2011/278/EU. The Danish National Implementation Measures (NIM) list was approved by the European Commission in January 2014.

The Danish NIM list is included in Annex A2. Note that changes in the allocation regarding cessation, partial cessation, capacity changes and changes in carbon leakage status after the 1st of January 2013 are not reflected in the tables in Annex A2.

Waste incineration plants which are primarily used for district heating were included in the ETS in Denmark by 1st of January 2013, while about 30 installations exclusively using biomass were excluded of the ETS. The inclusion of waste incineration plants lead to an increase in the total amount of CO_2-emission from the ETS in Denmark in 2013 compared to 2012.

Aviation has been a part of ETS since 2012. Aircraft operators get free allowances based on their activity and the scope.

Denmark's national allowance registry

Denmark's national allowance registry – (DK ETR – Emission Trading Registry[7]) has been operating since 1 January 2005. The DK ETR is used to allocate allowances to production facilities subject to allowances and enables trade in allowances among the allowance holders found in the registry. Since the 1st of July 2012 the DK ETR has been a part of the EU ETS that host the emission trading registry for all of the member states in the EU. The DK ETR is constructed so it also fulfils all Kyoto requirements.

The DK ETR is also functioning as the national registry under the Kyoto Protocol. The establishment of a functioning DK ETR pursuant to the Kyoto Protocol is a prerequisite for the application of the Kyoto mechanisms.

4.3.2 The Kyoto Protocol mechanisms

For the period 2008-2012, the flexible Kyoto Protocol mechanisms have been important elements in supplementing domestic reduction measures aimed at fulfilling the international climate commitment under the Kyoto Protocol and the subsequent EU Burden Sharing Agreement.

For the period 2013-2020, the government will not use the flexible Kyoto Protocol mechanisms for the achievement of Denmark's target under the EU Effort Sharing Decision, which is to be seen as Denmark's contribution to the EU joint target under the 2nd commitment period of the Kyoto Protocol. For the achievement of the joint EU target for the EU Emissions Trading Scheme's contribution to the EU joint overall target under the 2nd commitment period of the Kyoto Protocol, Danish entities under the EU ETS will be able to make use of the flexible Kyoto Protocol mechanisms.

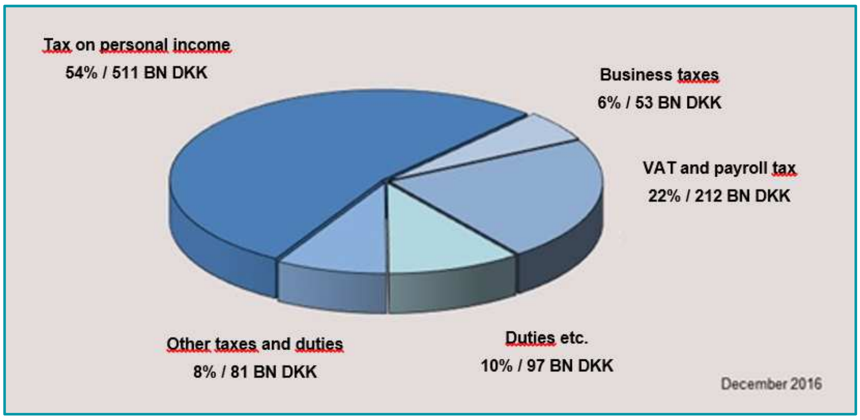
4.3.3 Taxes and duties

In Denmark, collected taxes and duties are expected to make up a total of approx. 46% of GDP in 2017. The public sector provides childcare, education, unemployment benefits, health and disability benefits, old-age pensions, and many other services.

Personal income tax is the most important tax, constituting about half of total tax revenues. Other taxes are VAT, duties, corporation taxes, and labour market contributions. Danish VAT is relatively high, 25%, and there are no differentiated rates. There are a considerable number of additional consumption taxes and environmental taxes. The corporation tax rate is 22%.

Total revenue from all taxes and duties is expected to amount to DKK 954 billion in 2017. The relative distribution is shown in Figure 4.9.

FIGURE 4.9 RELATIVE DISTRIBUTIONS OF TAXES AND DUTIES 2017
Source: Ministry of Taxation



Taxes that influence Denmark's greenhouse gas emissions

Retail prices on products that influence Danish greenhouse gas emissions are, in most cases, the decisive factor determining the degree to which they are consumed. Energy prices influence the composition and total size of energy consumption. Therefore extra taxes and duties put on products influence the consumption of these products and the size of greenhouse gas emissions associated with the use of the products.

Denmark has special taxes on motor vehicles, energy products, alcohol, tobacco, and a number of other products. During the past 25 years a number of new environmental taxes have been introduced. These taxes are imposed on consumer goods that cause pollution or are scarce (water, energy products such as oil, petrol, electricity, etc.) or on discharges of polluting substances (CO_2, HFCs, PVC, SF_6, SO_2, NO_x and sewage). Taxes are in accordance with EU legislation.

The introduction of CO_2 taxes and the increase in the rates of individual energy taxes since 1990 have had an effect on the consumption of a number of energy products and have therefore reduced the CO_2 emissions associated with consumption of these products.

4.3.3.1 *CO_2, CH_4, and N_2O - taxes and duties relevant to these emissions*

4.3.3.1.1 Energy

Denmark has had taxes on energy for many years. Since the first oil crisis in the early 1970s, the rates of the taxes have been aimed at reducing consumption and promoting the instigation of more energy-saving measures. Lower energy consumption will reduce emissions of CO_2, methane (CH_4), and nitrous oxide (N_2O) associated with combustion of fossil fuels.

Danish energy taxes are laid down in the four Danish tax acts on mineral-oil, gas, coal, and electricity, respectively (Mineralolieafgiftsloven, Gasafgiftsloven, Kulafgiftsloven, and Elafgiftsloven). As from 1 January 2016 the tax rates set in these four tax acts follow a yearly regulation based on the consumer price index of two years prior. Besides the energy taxes there is also a tax on CO_2, NO_x, sulphur and industrial gasses (see Table 4.5).

A tax on NO_x (nitrogen oxides) was originally introduced as part of a 2008 energy agreement and came into effect on 1 January 2010 with a rate of 5 DKK per kg NOx. From 1 January 2012, a considerable increase in the taxation of NOx from 5 DKK per kg NOx to 25 DKK per kg NOx was implemented. However, the rate was reduced in 2016 to 5 DKK per kg NOx.

A tax on sulphur in fuels was introduced 1 January 1996 with a rate of 20 DKK per kg sulphur in fuels and a rate of 10 DKK for SO_2 emitted to the air. One of the side effects of this tax is assumed to be a reduction in CO_2 emissions.

In March 2012 a general agreement on Danish energy policy from 2012-2020 was made. The agreement seeks to ensure the transition from an energy supply based on fossil fuels to one based on renewable energy.

TABLE 4.5 ENERGY TAXES 2010-2017

Source: Ministry of Taxation

	Unit	2010	2011	2012	2013	2014	2015	2016	2017
Coal	*DKK/toe*	2,399	2,445	2,487	2,533	3,006	2,282	2,299	2,315
Natural gas	*DKK/toe*	2,405	2,449	2,493	2,538	3,006	2,282	2,299	2,315
Oil products[1]	*DKK/toe*	2,400	2,443	2,487	2,532	3,009	2,282	2,299	2,315
Electricity: For heating	*DKK/kWh*	0.545	0.614	0.624	0.341	0.412	0.380	0.383	0.405
Electricity: Other	*DKK/kWh*	0.659	0.730	0.742	0.755	0.833	0.878	0.885	0.910
Waste: Heating from waste	*DKK/toe*	1,930	2,035[2]	2,072	2,110	2,504	1,901	1,918	1,926
Other compostable biomass	*DKK/toe*	0	0	0	0	0	0	0	0

[1]Only oil used for other purposes than motor fuels

[2]From 1 January 2011 – 30 June 2011 the rate was 1955.2 DKK/toe, where toe is the energy unit "tonnes oil equivalents".

<u>The Mineral-oil Tax Act</u> entered into force on 1 January 1993. Before this, the tax on petrol was regulated via the Petrol Tax Act, which entered into force on 1 January 1983, and the Act on Taxation of Gas Oil and Diesel Oil, Heating Oil, Heating Tar, and Crude Oil was regulated via the Act on Taxation of certain Oil Products, which

entered into force on 3 October 1977. Tax rates from recent years are shown in Table 4.6.

TABLE 4.6 TRENDS IN TAXES 2010-2017 UNDER THE MINERAL-OIL TAX ACT, STATED IN DKK/LITRE
Source: Ministry of Taxation

DKK per litre	2010	2011	01.01.12-30.06.12	01.07.12-31.12.12	2013	2014	2015	2016	2017
Gas oil and diesel oil used as motor fuels	2.774	2.825	2.876	2.840	2.891	2.944	2.997	3.021	3.039
Light diesel oil	2.669	2.718	2.767	2.731	2.780	2.830	2.881	2.904	2.921
Diesel low in sulphur content	2.479	2.524	2.570	2.534	2.579	2.626	2.674	2.695	2.711
Diesel without sulphur	2.479	2.524	2.570	2.534	2.579	2.626	2.674	2.695	2.711
Fuel oil	2.330	2.372	2.415	2.415	2.835[1]	2.921	2.215	2.233	2.246
Auto gas	1.726	1.757	1.788	1.719	1.749	1.782	1.814	1.829	1.839

[1] In January 2013, the rate was 2.458, and from February to December the rate was 2.869.

From 1 June 1999 a tax differentiation between light diesel and diesel low in sulphur was introduced, to encourage the use of diesel low in sulphur, which is less polluting than light diesel. This was accomplished and a change took place soon after to the effect that almost all diesel sold was low in sulphur. The purpose of further differentiation from 1 January 2005 favouring sulphur-free diesel was likewise to encourage the use of this type of diesel in favour of diesel low in sulphur, and this has been successful.

In addition, tax differentiation has been introduced in order to achieve environmental goals other than direct reductions in greenhouse gas emissions. Thus tax differentiation has been introduced with a view to phasing out lead in petrol. The rate of tax to achieve this environmental goal is shown in Table 4.7.

TABLE 4.7 TRENDS IN TAXES ON DIFFERENT TYPES OF PETROL 2010-2017, DKK PER LITRE
Source: Ministry of Taxation

DKK per litre	2010	2011	2012	2013	2014	2015	2016	2017
Petrol, with lead	4.567	4.649	4.733 / 4.700	4.785	4.871	4.959	4.999	5.028
Petrol, lead-free	3.881	3.951	4.022 / 3.989	4.062	4.134	4.209	4.243	4.268

[1] The term has been kept even though petrol companies in Denmark ceased using lead for octane improvement in 1994.

<u>The gas tax</u> on natural and town gas was introduced in its current form on 1 January 1996 with a rate for both natural and town gas at DKK 0.01/Nm^3. There has been taxation on gas, however, since 1 January 1979, when the tax on town gas and LPG was introduced. The tax on town gas was cancelled again in June 1983 and regulation of the tax on LPG was transferred to the Mineral-gas Tax Act when this

Act entered into force. From 1 January 2015 a tax on biogas was introduced. The tax rates on gas from recent years are shown in Table 4.8.

TABLE 4.8 TAXES ON GAS 2010-2017, DKK PER NM^3

Source: Ministry of Taxation

DKK per Nm^3	2010	2011	2012	2013	2014	2015	2016	2017
Natural gas	2.270	2.311	2.353	2.395	2.438	2.158	2.175	2.188
Town gas	2.270	2.311	2.353	2.395	2.438	2.158	2.175	2.188

The coal tax was introduced on 1 July 1982 and constituted DKK 127/tonne for hard coal and DKK 91/tonne for lignite and lignite briquettes on the day of entry into force. In the period 1 January 1997 - 31 December 2015 the tax increased from DKK 950/tonne to DKK 1526/tonne for hard coal and DKK 700/tonne to DKK 1036/tonne lignite. The rates have since 2008 developed as shown in Table 4.9. With effect from 1 January 1999, the so-called waste heat tax introduced (see Law no. 437 of 26 June 1998) as part of the Coal Tax Act. The waste heat tax was introduced in connection with increases in general taxes on fossil fuels to avoid giving too much incentive in favour of waste-based heat production, and to counteract the increased incentive for incineration of waste instead of recycling. From 1 January 2010 the tax was by burning waste converted from an amount of tax to a tax on energy and CO_2. Restructuring the waste incineration tax is no longer collected by Waste Tax Act, but is transferred to the Coal Tax and carbon dioxide tax law (see Law no. 461 of 12 June 2009 and the entry into force of Executive Order no. 1125 of 1 December 2009). Context of the proposal was especially that the then tax structure for waste fuels and fossil fuels taken together could result in waste streams are affected, so waste is not disposed of where it was most effective with regard to utilization of the waste energy. The purpose of the change was to make waste more cost-efficient, which means a welfare economic gain. The change improves the tax structure, because the waste now ordered virtually the same charges as fossil fuels. The restructuring charges will then be more neutral with respect to where the waste is burned. From 1 January 2010, energy from waste incineration imposed waste heat tax, surcharge and the CO_2 tax. CO_2 tax only if the waste is not biodegradable.

TABLE 4.9 TRENDS IN COAL TAXES 2010-2017, DKK PER TONNE

Source: Ministry of Taxation

DKK per tonne	2010	2011	2012	2013	2014	2015	2016	2017
Hard coal	1605	1634	1663	1693	2012	1526	1538	1547
Lignite	1089	1109	1129	1149	1365	1036	1044	1051

The electricity tax was introduced on 1 April 1977. With effect from 1 January 2013, the tax on electricity used for heating was reduced considerably, to take into account, that an increasing amount of renewable energy was being used in electricity production. It has been estimated that this will lead to an emission reduction outside the emissions trading scheme of 0.15 million tonnes CO_2 in 2015 and 0.29 million tonnes in 2018. Table 4.10 shows the development in electricity tax rates since 2008.

In November 2017 a political agreement has been made to reduce the tax on electricity for heating by DKK 0.15 per kWh in 2019, DKK 0.20 per kWh in 2020 and DKK 0.10 per kWh from 2021.

TABLE 4.10 TRENDS IN ELECTRICITY TAXES 2010-2017, DKK PER KWH

Source: Ministry of Taxation

DKK per kWh	2010	2011	2012	2013	2014	2015	2016	2017
Consumption of electricity, exceeding 4,000 kWh in all-year residences heated by electricity	0.545	0.614	0.624	0.341	0.412	0.380	0.383	0.405
Other electricity	0.659	0.730	0.742	0.755	0.833	0.878	0.885	0.910

The CO_2 tax on energy products was introduced on 1 March 1992 and was imposed on different types of energy products relative to their CO_2 emissions. A tax reduction was given to light and heavy industrial processes. From 1 January 2010 a structural change in the CO_2 tax was implemented as an adaption to the EU Emissions Trading Scheme. The tax rate was increased to DKK 150 /tonne of CO_2 indexed as mentioned below, cf. table 4.11. In total, this structural change in the CO_2 tax was estimated to lead to a reduction in the CO_2 emissions of 0.69 million tonnes.

Large waste incineration facilities are from 1 January 2013 included in the emissions trading scheme, which means that in order to avoid double taxation they are exempted from the CO_2 tax. This will lead to a reduction of CO_2 emissions outside the ETS of approximately 8.9 million tonnes.

TABLE 4.11 CO_2 TAX RATES, 2000-2017, STATED IN DKK PER TONNE OF CO_2

Source: Ministry of Taxation

DKK per tonne	2000-2004	2005-2009	2010[1]	2011	2012	2013	2014	2015	2016	2017
Basic rate										
Heating in industry	100	90	155.4	158.2	161.1	164.0	166.9	170.0	171.4	172.4
Light industrial processes										
Basic rate	90	90	-	-	-	-	-	-	-	-
With a voluntary agreement	68	68	-	-	-	-	-	-	-	-
Resulting subsidy	22	22	-	-	-	-	-	-	-	-
Heavy industrial processes										
Basic rate	25	25	-	-	-	-	-	-	-	-
With a voluntary agreement	3	3	-	-	-	-	-	-	-	-
Resulting subsidy	22	22	-	-	-	-	-	-	-	-
Industrial processes covered by the Emission Trading Scheme										
Basic rate [2]	-	-	0	0	0	0	0	0	0	0

[1] As of 1 January 2010 a structural change in the CO_2 tax was implemented. For the industries not regulated by the emissions trading scheme, a fixed lump sum transfer based on historical emissions was given, while the base rate was considerably increased to match the expected price of CO_2 quotas.

[2]Before 2010, the industrial processes covered by the ETS were taxed according to the table, depending on the type of process

Table 4.12 shows examples of the different types of CO_2 taxes converted into consumer units.

TABLE 4.12 EXAMPLES OF CO_2 TAXES

Source: Ministry of Taxation

	Unit	2010	2011	2012	2013	2014	2015	2016	2017
Gas oil and diesel oil	*DKK/litre*	0.413	0.420	0.428	0.435	0.443	0.451	0.455	0.457
Gas oil and diesel oil containing 4,8% bio fuel	*DKK/litre*	0.385	0.391	0.399	0.405	0.413	0.420	0.423	0.426
Fuel oil	*DKK/kg*	0.493	0.502	0.511	0.520	0.529	0.539	0.543	0.547
Lignite	*DKK/tonne*	225.8	225.9	225.10	225.11	301.3	306.8	309.8	311.1
Natural gas and town gas	*DKK/Nm³*	0.351	0.357	0.364	0.370	0.377	0.384	0.387	0.389
Petrol	*DKK/litre*	0.373	0.379	0.386	0.393	0.400	0.408	0.411	0.414
Petrol containing 4,8% bio fuel	*DKK/litre*	0.355	0.361	0.367	0.374	0.381	0.388	0.391	0.393

In addition to this, there are CO_2 taxes on heating tar, crude oil, coke, crude oil coke, lignite briquettes and lignite, LPG, and other gases.

As of 1 January 2008 the CO_2 taxes follow a yearly regulation of 1.8% in the period 2008-2015, similar to the energy taxes. From 2016 the tax is regulated with the consumer price index two years prior as the energy taxes.

4.3.3.1.2 Transport

In the transport sector, the number of cars in Denmark and the use of motorised vehicles are influenced by the tax on cars and fuels. The latter has been described above.

The registration tax on motorised vehicles is calculated on basis of the value of the vehicle. It is furthermore integrated in the design of the registration tax that cars are granted deductions in the registration tax with reference to their specific energy efficiency and safety equipment. Cars with high energy efficiencies, such as electric vehicles, are granted large reductions in the registration tax.

Electric vehicles are furthermore granted deductions in the registration tax until 2021. The deductions are given as percentage rebates on the total registration tax of the vehicle, after all other deductions, and is gradually phased in from 2016 to 2021. Furthermore a deduction dependant on battery capacity is given. Additionally, there is a fixed deduction in 2016 and 2019.

Car owners have to pay half-yearly taxes which are differentiated in accordance with the fuel efficiency of the cars, expressed in kilometres per litre. The energy consumption of electric cars is converted to a petrol fuel efficiency on the basis of the energy content of petrol. Examples of classes from 2017 are shown in Table 4.13. From July the 1st 2018 the owner ship tax for new registered cars is increased by 250 DKK half-yearly and there is introduced new classes in the ownership tax for the most energy efficient cars.

TABLE 4.13 EXAMPLES FROM THE DANISH STRUCTURE OF TAX INCENTIVES BASED ON ANNUAL TAXES ON MOTOR VEHICLES (2017), DKK/YEAR

Source: Ministry of Taxation

Type of fuel	Fuel consumption (km/l)	Annual tax (DKK/year)
Petrol	**> 20.0**	620
	10.0 – 10.5	6,460
	< 4.5	21,660
Diesel	**> 32.1**	260
	28.1-32.1	1,180
	25-28.1	2,120
	22.5 - 25.0	2,920
	10.2 – 11.3	12,620
	< 5.1	32,200

4.3.3.1.3 The household sector

For the household sector, the taxes levied on consumption of electricity and heat affect consumption figures, since these products become more expensive with the introduction of taxes.

*4.3.3.2 **HFCs, PFCs, and SF_6 - taxes and duties relevant to these emissions***

Since 1 March 2001, imports of industrial gases HFCs, PFCs, and SF_6 (F-gases) in the industry/business sector have been subject to taxation. The tax is differentiated in accordance with the global warming potential of the substance with DKK 0.15 per kilogramme of CO_2 equivalents as the general principle and with DKK 600 per kilogramme as a general upper limit cf. the examples in Table 4.14.

As the taxes on industrial gases are based on the CO_2 tax, there was an increase in 2011, from DKK 0.10 per kilogramme of CO_2 equivalents to DKK 0.15, following the increased CO_2 tax rate shown in Table 4.11. The impact of this increase is expected to lead to a reduction in the emission of the industrial gasses of 0.02 million tonnes CO_2 equivalents.

TABLE 4.14 EXAMPLES OF TAXES ON F-GASES, 2017

Source: Ministry of Taxation

Substance	GWP	Tax in DKK per kg
HFC-134a	**1430**	215
R404a (a combination of 3 HFCs)	**3922**	588
SF_6	**22800**	600

4.3.3.3 *Tax on methane emissions from natural gas fired power plants - equal in terms of CO_2 equivalents to the CO_2 tax.*

As of 1 January 2011 a tax on methane emissions - equal in terms of CO_2 equivalents to the CO_2 tax - from natural gas fired power plants was introduced. This is expected to reduce methane emissions from gas engines through behavioural changes such as changing from motor operation to boiler operation and establishing mitigation measures. Consumption is also expected to fall as the price of heat will increase. These behavioural changes will result in falls in the emissions of unburned methane from power stations. In addition, CO_2 emissions will fall and consumption of natural gas will fall. In total, a decline of 0.06 million tonnes CO_2 equivalent emissions in 2 out of 5 years is expected, corresponding to an average annual reduction effect of approximately 0.02 million tonnes CO_2 equivalent per year in 2008-12.

In Table 4.15[17] contains an overview of all taxes and duties relevant to greenhouse gas emissions in Denmark.

TABLE 4.15 OVERVIEW OF TAX AND DUTY MEASURES

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
TD-1b: Mineral-oil Tax Act	Yes*	Energy, Transport	CO2, CH4, N2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1993	Government:Ministry of Taxation	1200 and IE(G1 and G4)	1200 and IE(G1 and G4)	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
TD-2: Gas Tax Act	Yes*	Energy	CO2, CH4, N2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1996	Government:Ministry of Taxation	IE (G1, G2 and G4)	IE (G1, G2 and G4)	
TD-3: Coal Tax Act	Yes*	Energy	CO2, CH4, N2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1982	Government:Ministry of Taxation	IE (G1, G2 and G4)	IE (G1, G2 and G4)	
TD-4: Electricity Tax	Yes*	Energy	CO2, CH4, N2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1977	Government:Ministry of Taxation	IE (G1, G2 and G4)	IE (G1, G2 and G4)	
TD-5: CO2 tax on energy products	Yes*	Energy	CO2	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1992	Government:Ministry of Taxation	410 and IE (G1 and G4)	410 and IE (G1 and G4)	
TD-6: Green Owner Tax - a fuel-efficiency-dependent annual tax on motor vehicles	Yes*	Transport	CO2, CH4, N2O	Demand management/reduction (Energy consumption), Low carbon fuels/electric cars (Transport)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1997	Government:Ministry of Taxation	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TD-7: Registration Tax - a fuel-efficiency-dependant registration tax on passenger cars and vans	Yes*	Transport	CO2, CH4, N2O	Demand management/reduction (Energy consumption), Low carbon fuels/electric cars (Transport)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2000	Government:Ministry of Taxation	IE (G1 and G4)	IE (G1 and G4)	
TD-8: Tax on HFCs, PFCs and SF6 - equivalent to the CO2 tax	Yes*	Transport	HFCs, PFCs, SF6	Reduction of emissions of fluorinated gases (Industrial processes)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2001	Government:Ministry of Taxation	IE (G1 and G6)	IE (G1 and G6)	
TD-9: Tax on methane from natural gas fired power plants - equivalent to the CO2 tax	Yes*	Energy	CH4, CO2	Reduction of losses (Energy supply), Control of fugitive emissions from energy production (Energy supply), Methane reduction ()	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2011	Government:Ministry of Taxation	30	30	Estimates in 2017 - based on The 2013 Analysis of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
G2(former TD-1a): Energy taxes except on mineral oil	Yes*	Combined (TD-2, TD-3 and TD-4)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	1000	1000	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.4 The National Green Climate Fund

In connection with the PSO Agreement of 2016 a majority of political parties in the Danish parliament decided to allocate funds to a national green climate fund. The fund is targeted initiatives accross all sectors that promote the green transition in an appropriate manner, including in particular initiatives that can contribute to the to the achievement of Denmark's 2030 greenhouse gas emission reduction target in the non-ETS sector, etc. The total budget for the fund is DKK 375 million for the period 2017-2020 - with DKK 50 million in 2017, DKK 50 million in 2018, DKK 100 million in 2019 and DKK 175 million in 2020.

In June 2017, the 1st allocation of the budget was decided. From the budget for 2017, 2018 and partially 2019 a total of DKK 104-106 million has been allocated for the initiatives mentioned in Table 4.16. A short description of the initiatives is included below.

The estimated greenhouse gas emission reduction effect of these initiatives is in total up to 56,000 tonnes of CO_2 eq. annually in the period 2021-2030.

The allocations for 2019 and 2020 will be discussed between the political parties in the PSO Agreement in accordance with the purpose of the fund.

TABLE 4.16 OVERVIEW OF THE INITIATIVES IN THE 1ST ALLOCATION OF FUNDS IN THE NATIONAL GREEN CLIMATE FUND

DKK million	*2017*	*2018*	*2019*	*2020*
Annual budget	**50**	**50**	**100**	**175**
Measures in the district heating sector				
1.1 Establishment grants for electric heat pumps on non-ETS cogeneration plants	23.9	28.9	-	-
1.2 Mapping and advisory efforts for decentralized CHP plants	4.0	6.0	4.0	-
Other actions				
2. Recycling system for flammable refrigerants	2.5	-	-	-
3. Reduced retention time for slurry in stables	0.0	9.0	-	-
4. Climate-friendly road surface	0.6	3.1	-	-
5. Demonstration project - bio refinery plant	8.0	-	-	-
6. Measurement of nitrous oxide from wastewater	-	3.0	2.0	-
7. Heat pumps on subscription for the business sector	11.0	-	-	-
Total 1st allocation	**50.0**	**50.0**	**6.0**	**-**

1.1 Establishment grants for electric heat pumps on non-ETS cogeneration plants

For the purpose of promoting heat pumps, a temporary pool is set up for collective heat pumps at non-ETS cogeneration plants. The scheme includes heat pumps that utilize different heat sources, including surplus heat, heat from wastewater treatment plants, etc. The support will ensure a good framework for choosing heat pumps.

1.2 Mapping and advisory efforts for decentralized CHP plants

A targeted advisory scheme for decentralized CHP plants is introduced within and outside the ETS sector. The advice includes technical, administrative, financial and financial matters. The scheme shall include identification of concrete actions at the plants that can lower the heat price for consumers and greenhouse gas emissions from heat production. The technical efficiency improvements of the CHP plants are expected to lead to CO_2 reductions in the sector.

2. Recycling system for flammable refrigerants

Funds are set aside for establishing a recycling system for climate-friendly but flammable refrigerants in cooperation with the refrigeration industry. In general, for fluorinated refrigerants, the more climate-friendly they are (low GWP), the greater flammability. With the establishment of a new recycling system, a significant barrier for the wider and accelerated use of climate friendly, but flammable, refrigerants is eliminated.

3. Reduced retention time for slurry in stables

Funds are allocated for a travel team that can support the 27 existing biogas joint facilities to conduct further investigations of barriers, development of solutions with more frequent collection of slurry from suppliers, as well as information / advice to suppliers regarding the importance of frequent collection in order to utilize the gas potential of the slurry. Biogas plants are generally expected to be of great interest in getting the slurry faster for degassing as it will provide a larger amount of gas with the same amount of slurry.

4. Climate-friendly road surface

A demonstration road with climate-friendly road surface / asphalt is set up with the aim of obtaining final clarity regarding laying techniques, durability and functional properties. In addition to delivering concrete reductions, the demonstration project will ensure that material selection and evaluation techniques have been tested and optimized in a real production environment.

5. Demonstration project - bio refinery plant

A pool will be allocated for targeted support for projects concerning establishment of a green bio refinery pilot plant. The establishment of a pilot plant for bio refining of green biomass can promote the use of agricultural crops with more positive climate and environmental impacts than, for example, grain crops. Bio refining of clover grass can produce a pulp for biogas, press cakes for cattle feed and protein concentrate for fodder products. The purpose of the pilot plant is to qualify, optimize and demonstrate the technology. The objectives are to reduce the technology costs, create a market segment and to map expected effects and side effects.

6. Measurement of nitrous oxide from wastewater

A prerequisite for reducing the emission of nitrous oxide from wastewater treatment plants is more accurate knowledge of the processes that lead to nitrous oxide formation. A pool is therefore established for tests on the measurement and regulation of nitrous oxide at the wastewater treatment plants. The purpose of the project is to 1) improve the accuracy of the national greenhouse gas emission inventories, 2) establish the basis for more accurate shadow price calculations for reduction measures in the area, 3) provide a basis for reducing nitrous oxide emissions from wastewater treatment plants that receive means for measuring and regulating nitrous oxide emissions as well as in other Danish wastewater treatment plants.

7. Heat pumps on subscription for the business sector

A pool is being established to support the purchase of a number of heat pumps by a number of energy service companies that they install with their customers. It is expected that the scheme will lead to a large number of conversions from oil furnaces to heat pumps in the business sector during the next 4 years. It is also expected that the initiative could initiate a commercial market for fossil fuel conversion at companies.

4.3.5 Energy (Fuel Combustion, including Transport, and Fugitive Emissions from Fuels)

The energy sector's greenhouse gas emissions made up 72% of Denmark's total greenhouse gas emissions in 2015 (without LULUCF), of which CO_2 was the primary emission. 97.8% of the emissions from the energy sector are CO_2. 1.1% is methane (CH_4), and the remaining 1.1% is nitrous oxide (N_2O).

4.3.5.1 ***CO_2***

Energy production and energy-consuming activities in the transport sector and industry are main contributors to the total emissions of CO_2 due to use of large quantities of coal, oil and natural gas. The energy sector is, therefore, centrally placed in efforts to reduce emissions of CO_2.

Many initiatives have been taken over the years to reduce the emissions, and work is still going on to find the best and most cost-effective measures with the objective to fulfil Denmark's international climate obligations.

Danish experience shows that through persistent and active energy policy focus on enhanced energy efficiency and conversion to cleaner and renewable energy sources, it is possible to sustain high economic growth and at the same time reduce fossil fuel dependency and protect the environment.

The energy sector is fully liberalised. Today, electricity production from Danish power plants is controlled by market forces. Danish electricity generation is traded freely across national borders on the Nordic and the north-German electricity markets. Thus there is a significant extent of integration in the Northern European electricity market. This entails, for example, that increased use of renewable energy in the Danish electricity system or enhanced efforts to save electricity do not automatically mean that generation at coal-fired power plants is reduced correspondingly during the first commitment period of the Kyoto Protocol 2008-2012.

The introduction of the CO_2 allowance regulations through the EU emissions trading scheme (EU ETS) has been pivotal for Denmark's possibilities to comply with the climate commitments. The EU ETS constitutes a central instrument in ensuring that the Danish energy sector is enabled to provide the reductions required if Denmark is to comply with its climate obligations. At the same time, the EU ETS permits significant improvements to the cost effectiveness of Denmark's climate effort.

The government's long-term objective is to become a nation with an energy supply solely based on renewable energy sources and thus independent of fossil fuels.

The objective of the Danish energy policy today is security of supply, environmental concerns, energy savings and well-functioning energy markets within frameworks that secure cost effectiveness. Several initiatives often meet more than one of the purposes mentioned at the same time. Efforts concerning climate change should thus be seen in a broader context than CO_2 alone, not least when it comes to the purpose and calculation of effects.

The costs to Denmark of meeting climate obligations are less than they could have been. Denmark gave priority to renewable energy sources and energy efficiency early on. Most of the public support schemes and regulations have prioritised energy efficiency and renewable energy. In this respect the development in Denmark has been quite different from other IEA countries, which have invested in new energy supply – notably nuclear energy.

Danish public support programmes have instigated competition amongst private companies. Most public support for energy research and development in Denmark has been open for competing applicants. Similarly, all procurement of energy technologies induced by public schemes has followed EU rules requiring open tenders or has left it to competitive markets in general.

A large number of policies and measures have been implemented over the years to meet the various energy-policy objectives cf. Table 4.16.

4.3.5.1.1 The allowance regulation relevant to the energy sector

A key instrument for reaching the goals for emission reductions is the EU Emission Trading Scheme (EU ETS), which is a CO_2 allowance scheme for energy production and energy-intensive industries as described in section 4.3.1. The EU Member States have devised this trading scheme for greenhouse gas emissions in order to fulfil the international climate commitments set out in the Kyoto Protocol, in particular with the aim of reducing CO_2 emissions from energy production and energy-intensive industries.

The allowances scheme entered into force on 1 January 2005. The 2005-2007 period was used as a testing phase. The EU ETS Directive has been revised a number of times.

The allowance allocation for 2008-2012 was determined on the basis of the national allocation plan from July 2006, submitted the European Commission. The EU ETS 2008-2012 has been an important measure in Denmark's fulfilment of its climate obligations under the first commitment period of the Kyoto Protocol. The scheme aligns well with government policy for the energy area on liberalisation of the energy markets and management of environment efforts by the market.

The installations subject to the allowance regulations account for a little less than half of Danish emissions of greenhouse gases. Almost all major Danish installations with considerable emissions are covered by the ETS. Most of these are generators of power and heat, the rest are industrial enterprises plus a few production units within the offshore sector.

Both the statutory and the administrative basis for the scheme have been established. The necessary legal basis was adopted by the Danish Folketing in June 2004 and the 2008-2012 national allocation plan was approved by the European Commission on 31 August 2007.

According to the national allocation plan for the period 2008-2012 an average annual allowance of 24.5 million tonnes CO_2 has been allocated. According to the allocation plan this should correspond to a drop in annual emissions of about 5 million tonnes per year in 2008-2012, or a reduction of about 17% compared with emissions expected in the national allocation plan for the period. This level was set by balancing environmental considerations against competitiveness and jobs:

- Electricity and heat producers were allocated about 15.8 million EAUs. The allowance for electricity generation is allocated as ”per kWh”, while for heat production allowances are allocated according to emissions in the base years 1998-2004.

- The other 133 installations (industry and offshore) have been allocated allowances corresponding to emissions in the base years 1998-2004. A total of 8.2 million tonnes CO_2 per year have been allocated to industry and offshore.

- A special reserve of 0.5 million tonnes CO_2 per year has been allocated with free allowances for new installations and significant extensions to existing units.

Allowances not allocated by the end of the commitment period or returned due to closures have been auctioned. The period 2008 – 2012 was finalized in 2013 with the final surrendering of allowances and credits by companies participating in the EU ETS as shown in section 4.3.1.

The new EU Climate and Energy Agreement from December 2008 extended the ETS system to 2013-2020 in order for the EU to reduce CO_2 emissions by 20% in 2020. At the same time allocation was centralised and auctioning is to be used more extensively from 2013. The allowances have been calculated for this period in accordance with the EU benchmarking decision 2011/278/EU. Annex A2 contains an overview of the installations and aviation operators covered and their allowance allocation for 2013-2020.

However, the current low allowances price has made it more difficult to initiate the necessary transition and green investments after 2012.

Developments in allowances prices have particular significance for Danish emissions and they affect the need to initiate other, new mitigation initiatives. The low allowances price makes the situation relatively more expensive for countries like Denmark, who want to take the lead. Therefore, efforts to increase the level of ambition in EU climate policy are key in the Danish government’s climate change policy to achieve the national target.

Denmark’s efforts in this regard are further described in section 4.1.2.3.

4.3.5.1.2 *Energy and CO_2 taxes*

Taxes have also been used for many years as an instrument to reduce CO_2 emissions from the energy sector, since fuels used for heat production are subject to energy and CO_2 taxes. The main objective is general GHG reductions and the promotion of the use of fuels with lower CO_2 emissions, mainly biomass. Energy and CO_2 taxes are described in detail in section 4.3.3.

4.3.5.1.3 *Combined heat and power*

The main elements of the Danish strategy to promote renewable energy and the efficient use of energy resources since the end of the 1970s have been increased use of CHP and expanding of district heating areas. Effective heat supply planning has ensured the highest share of district heating and CHP in the Western Hemisphere. This has secured early markets for district heating technologies and a possibility for the use of many renewable energy sources like straw, municipal waste, wood waste and geothermal energy. About half of Denmark's domestic electricity consumption is produced on CHP plants, and the potential for further use of CHP is limited. Wind energy delivered about 42 % of domestic electricity supply in 2015 and is expected to deliver 50% of domestic electricity supply by 2020. For this reason the CHP production is expected to be reduced in the future, though CHP and the valuable services CHP plants provide - also in terms of back up capacity - is expected to remain an integral part of the overall system. CHP has been promoted partly by the tax system, partly by electricity production subsidies for biomass and biogas.

4.3.5.1.4 *Renewable energy*

The increasing use of renewable energy sources is reducing emissions of CO_2 from fossil fuels. The long term goal for the Danish government is to be independent of fossil fuels by 2050. The initiatives in the political energy agreement concluded by the government and a broad majority in the Parliament in March 2012 cover these crucial energy policy areas for the period until 2020. The parties to the current energy agreement have agreed by 2018 to commence discussions on additional initiatives for the period after 2020.

The expected headline results for 2020 are the following: more than 40% renewable energy in final energy consumption; approximately 50% of electricity consumption to be supplied by wind power; approximately 8% reduction in gross energy consumption in relation 2010; and 34% reduction in greenhouse gas emissions in relation to 1990.

Renewable energy sources are promoted with economic measures, including use of energy and CO_2 taxes on fossil fuels and through the Public Service Obligation Schemes (PSO), which have been a supplement to the price of electricity paid by all consumers until 2017. The Danish PSO levy will be phased out during a period of 5 years (2017-2022), and the financing of support to renewables will gradually shift to the State Budget.

As a first step the government reached a political agreement in September 2017 on tenders in 2018 and 2019 allowing photovoltaic panels and wind turbines to compete to deliver the most green power to consumers for a total of approx. DKK 1 billion allocated for a fixed feed-in tariff subsidy. It is expected that the allocated funds could generate approx. 190 MW new renewable energy capacity with an annual production equivalent to about 140,000 Danish households' annual electricity consumption. The new capacity could exceed the expected 190 MW if the bids in the tenders are lower than expected.

According to the September 2017 agreement a transitional arrangement for ongoing wind turbine projects will also be established.

In addition, it was also agreed to allocate DKK 150 million for new test wind turbines, which is expected to lead to the establishment of new test wind turbines with a total capacity of approximately 130 MW during the agreed three-year support period.

Wind power

In accordance with the energy policy agreement from February 2008, the expansion of wind power since the Fifth National Communication in December 2009 has included a tender for and construction of a 400 MW offshore wind farm at the island of Anholt. This wind farm started to operate in September 2013. The current Energy Agreement set in place in 2012 includes a target of applying another 1900 MW of new capacity from onshore and offshore wind by the end of 2021. Most of the new capacity will come from offshore wind power. In this respect the Danish Energy Agency was responsible for tendering 1350 MW new offshore capacity: The Horns Rev 3 tender of 400 MW in the North Sea with expected commissioning in 2018, the Kriegers Flak tender of 600 MW in the Baltic Sea with expected commissioning in the period 2019-21 and the so-called near shore tender of 350 MW – Vesterhav Nord and Syd - with expected commissioning in 2020. Also part of the 2012 Energy Agreement, Denmark was responsible for tendering 50 MW offshore test projects – Nissum Bredning test project (28MW) was signed with expected commissioning in 2017. As a result, wind energy is expected to cover 50 % of Danish electricity consumption in 2020.

Biomass

In 2015, biomass accounted for approximately 62% of renewable-energy production, mostly in the form of straw, wood pellets, wood chip and biodegradable waste for incineration. Approximately half of the biomass was imported, mainly in the form of wood pellets (32 PJ), biofuels (7 PJ), wood chips (6 PJ) and fire wood (3 PJ).

The energy production from biomass has more than doubled since 1990 - primarily due to the policy agreement from 1993 (the Biomass Agreement: requires power plants to use 1.4 million tonnes of straw and wood, equivalent to almost 20 PJ per year) and the policy agreement from February 2008 on the increased use of straw and chips at the large co-generation plants (up to 700,000 tonnes in 2011). At the same time, the consumption of biomass continues to rise as a source of energy for the supply of heat in district-heating plants and in smaller installations for households, enterprises and institutions.

Although it was demonstrated in Denmark in the mid-1990s that biogas plants can be established with reliable operation and with an acceptable economy biogas still only accounted for 3.3% of renewable-energy production in 2013.

Liquid biofuels, such as animal and vegetable oils, biodiesel and bioethanol, is used only on a small scale. Liquid biofuels from bio-waste by the so-called second generation technologies are now at a low level.

4.3.5.1.5 Fuel conversion from coal to natural gas

Substitution of coal and oil by natural gas reduces emissions of CO_2. The first Danish natural gas was landed from the Danish sector of the North Sea in 1984, and since then consumption of natural gas has increased to 193 PJ in 2001. Since then, consumption has decreased to 130 PJ in 2015 due mainly to high gas prices. Natural gas now covers 17% of gross energy consumption. In the power sector, natural gas was introduced in 1985 and peaked with 25% around 2000. In 2015, this had decreased to 8%, mainly due to the relation between power prices and gas prices. The use of natural gas is expected to decrease further as a result of introducing more renewable energy and extensive energy-saving policies.

4.3.5.1.6 Research and development

Danish support for new energy technologies has been comprehensive and relatively stable. A long list of direct and indirect support schemes and policies have, in combination, created a domestic market which has given Danish companies a boost. This boost has enabled many companies to become international market leaders. Danish companies continue to enjoy commercial success within the energy-related marketplace.

R&D activities include energy savings, more efficient energy conversion, renewable energy technologies and efforts within System Integration and Smart Energy.

Research and development activities in the field of energy are not motivated solely by climate issues, but are relevant to climate issues, since they contribute to determining the overall framework for the CO_2 intensity of energy production and consumption in the future.

There is a broad political commitment to support R&D activities through public funding and the Danish Government has in its manifesto by November 2016 stated that Denmark is committed to an ambitious green transition for the national energy supply. This calls for comprehensive R&D efforts for the development of improved and new sustainable energy technologies.

Denmark is one of the partners in the public-private initiative Mission Innovation comprising 22 countries and the European Commission. The aim of Mission Innovation, that was founded in relation to the COP21 in Paris 2015, is to strengthen the multilateral R&D efforts within clean energy technologies to promote a continuous cost effective green transition of the energy systems.

Thus Denmark as one of the partners has chosen to strengthen the dedicated public investments in clean energy research, development and demonstration focusing on reduction of technology costs and CO_2 emissions and with an emphasis on innovative projects that can be replicated and scaled up with the involvement of private investors. Denmark will seek to double these efforts departing from a baseline of the average funding to the Danish Energy Technology Development and Demonstration Programme (EUDP) of the years 2015-2016 and until 2020 where DKK 580 million will be allocated.

The EUDP programme was established in 2008 and since then the programme has supported more than 600 projects with a total of DDK 3 billion. On average, 45-50% of the activities under the Programme are financed by the EUDP and hence the private investments in the supported projects are of the same size as the public support leading to approximately to DKK 6 billion in total investments. The Danish Parliament has dedicated DKK 400 million for EUDP for the fiscal year 2018.

A minor programme is administrated on behalf of the power distribution companies by the Danish power association Dansk Energi. The objective is to support research and development within energy-efficient use of electricity through development of energy-efficient products and processes in buildings, industry etc. The annual funds for this programme are DKK 25 million.

Activities relating to strategic research and innovation in general are since 2014 administrated by Danish Innovation Fond. The Fund covers all sorts of research and innovation projects and is not limited to energy matters. However, for 2017 and 2018 DKK at least 100 million /year will be earmarked for R&D within new and clean energy technologies.

4.3.5.1.7 Energy savings

Reducing energy consumption by increasing energy efficiency and promoting energy saving is a very important element for Danish energy policy.

Among the grid and distribution companies (electricity, natural gas, oil and heating), the electricity companies have been working with energy savings since the early 1990s and the natural gas and district heating companies have been working with energy savings since 2000.

In the most recent years, since 2005 several political agreements to significantly strengthen energy-saving efforts in Denmark have been reached.
In the most recent agreement, the 2012 energy policy agreement, energy-saving efforts were increased even more.

In the 2012 policy agreement the obligation for the grid and distribution companies in the electricity, natural-gas, district-heating and oil sectors was increased by 75% in 2013 and 2014 (to 10.7 PJ) and by 100% from 2015 to 2020 (to 12.2 PJ). In December 2016 the Minister of Energy, Utilities and Climate entered into a new agreement, on energy savings with the trade associations representing the electricity-grid, natural-gas, district heating, and oil companies for the period 2016-2020. The obligation was decreased from 12.2 PJ to 10.1 PJ. The agreement ensures continued implementation of Article 7 of the EU energy efficiency directive.

The obligations have been implemented as voluntary agreements between the Minister of Energy, Utilities and Climate and trade associations representing the electricity-grid, natural-gas, district heating, and oil companies. The companies have a high degree of freedom regarding methodology. The energy companies' costs are financed by a levy on their tariffs.

The development of a comprehensive long-term strategy for renovation of existing buildings was also a part of the agreement. The strategy was launched in May 2014 with the title "Strategy for energy renovation of buildings".

The Danish Energy Agency is responsible for authority tasks throughout the energy-savings area. In addition to legislation and regulation, the area includes the further negotiations within the EU on implementation and control of EU Directives, for example on labelling, energy efficiency requirements (Eco-design), buildings and the Energy Efficiency Directive, as well as a number of operational tasks such as energy labelling of buildings. The agency's tasks include setting the framework for and administrating the savings activities of the grid and distribution companies.

As a part of the energy policy agreements of 22 March 2012, it was decided to close the Centre for Energy Savings. Some of their activities have been taken over by the Danish Energy Agency.

Targeted work to improve energy efficiency specifically in the public sector has been going on for many years, and considerable savings have been achieved. In 2014 a new circular on energy efficiency in state institutions was reviewed in line with the requirements in Articles 5 and 6 of the EU Energy Efficiency Directive.

Data on energy consumption in the public sector have been collected for some years as means of rendering the sector's energy consumption visible. In 2016 an evaluation of the effort was carried out. The evaluation shows that most ministries are well underway with the realization of the EU target of savings of 9.1 % for the period 2013-2020, and that Denmark is well on track to meet both national and EU objectives regarding energy consumption in state institutions.

TABLE 4.16 INITIATIVES AND MEASURES IN THE ENERGY SECTOR (SEE ALSO SPECIFIC MEASURES IN TABLE 4.17 (BUSINESS), 4.18 (HOUSEHOLD S) AND 4.19 (TRANSPORT)).

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
EN-1: EU-CO2-emission trading scheme for electricity and district heat production and certain industrial processes (incl. Business) and aviation from 2012	Yes*	Energy, Industry/Industrial processes, Cross-cutting	CO2	Switch to less carbon-intensive fuels (Energy supply), Increase in renewable energy (Energy supply), Efficiency improvement in the energy and transformation sector (Energy supply), Control of fugitive emissions from energy production (Energy supply)	Regulatory, Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2005	Government:Danish Energy Agency and entities uner the EU ETS	IE (G1, G3 and G4)	IE (G1, G3 and G4)	
EN-2: Biomass Agreement (Agreement on the use of biomass in electricity production)	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic, Voluntary Agreement	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1993	Government:The electricity producers	1100 and IE (G1 and G3)	1100 and IE (G1 and G3)	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
EN-3: Price supplement and subsidies for renewable energy production	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2008	Government:Danish Energy Agency and entities responsible for energy production	IE (G1 and G3)	IE (G1 and G3)	
EN-4: Tenders for offshore wind turbines	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2013	Government:Danish Energy Agency and entities responsible for energy production	IE (G1 and G3)	IE (G1 and G3)	
EN-5(expired): Scrapping scheme for old wind turbines	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2008	Government:Danish Energy Agency	IE (G1 and G3)	IE (G1 and G3)	
EN-6: Energy development and demonstration	Yes*	Energy	CO2, CH4, N2O	Research and development (), Research and development (), Research and development ()	Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2008	Government:EUDP Secretariat c/o Danish Energy Agency	IE (G1)	IE (G1)	
G3: All RE mitigation actions (Renewable Energy) since 1990	Yes*	Combined (EN-2, EN-3, EN-4, EN-5, BU-8 and TR-8)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	22805	24060	Estimated in 2017 - sse Annex B4.
G4: All EE mitigation actions (Energy Efficiency) since 1990	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7; EN-1; BU-1, -2, -6, -7, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -10, -11, -12; HO-1, -2, -3, -4, -5, -6)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	16944	18793	Estimated in 2017 - sse Annex B4.

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.5.1.8 *Specific measures in the business sector (Fuel combustion in Manufacturing Industries and Construction, Commercial/Institutional and Agriculture, Forestry and Fisheries)*

Energy use in the business sector covers energy use in Manufacturing Industries and Construction, Commercial/Institutional and Agriculture, Forestry and Fisheries. In 2015, energy use in the business sector was responsible for 13.6% of Denmark's total greenhouse gas emissions.

In 2015, the greenhouse gas emissions from energy use in the business sector decreased by approximately 32% from 9.6 million tonnes CO_2 equivalents in 1990 to 6.5 million tonnes CO_2 equivalents in 2015, primarily due to improvements in energy efficiency and energy savings.

According to the March 2017 projection, the expected emissions from the business sector's energy use are an average of 6.5 million tonnes CO_2 equivalents in 2015 increasing to 6.7 million tonnes CO_2 equivalents in 2030.

The on-going initiatives to reduce emissions from the business sector include promotion of energy savings and energy-efficiency improvements as well as conversion of energy production to cleaner fuels. Certain energy-intensive businesses are also subject to allowances regulation as a consequence of the EU Emission Trading Scheme.

Analyses have shown that there is a big potential for profitable energy-efficiency improvements within the business sector, so improving energy efficiency is a vital area of action.

The measures implemented in the business sector are shown in Table 4.17[17].

Industry is responsible for most of the sectors' emissions of CO_2. The emissions come mainly from energy-consuming activities in industry. Cement and brick production also contributes especially high levels of CO_2, due to the raw materials used.

The main instrument to reduce CO_2 emissions in energy-intensive industry is the EU's emission allowance scheme, covering about 120 industry installations.

Business and industry have introduced major energy efficiencies over the past 25 years. This is mainly due to a green tax package for the business sector, which was firstly introduced in 1995. The package contained a combination of taxes and discounts for energy intensive enterprises. The package led to a higher CO_2 tax and the introduction of a space-heating tax for businesses. In order to get the tax discount, the eligible energy intensive enterprises have to sign an agreement on energy efficiency with the Danish Energy Agency. With the political agreement on economic growth from 2013, the CO_2 tax on electricity in production process in the industry was abolished and the voluntary agreement scheme ended. With a political agreement on economy growth from July 2014 it was decided to revive the voluntary agreement scheme. The new scheme entered into force in September 2015. The current scheme subsidizes electricity-intensive enterprises payment of electricity tax (the PSO tax until 2020 – cf. the phase-out of the PSO mentioned in Chapter 4.3.4.1.4).

As an element in the implementation of the 2012 energy policy agreement, a DKK 3.75 billion (€500m) fund was established to subsidise industries to convert to renewable energy. As of August 2013, businesses have been able to get investment subsidy from this fund to convert from fossil fuel (i.e. coal, oil, gas) to renewable energy sources (i.e. biomass, solar, wind) or district heating in their production process. The subsidy also includes investments in energy-efficiency measures. The estimated effect of this “Renewables for industry” initiative is a reduction of 1 million tonnes of CO_2 per year from 2020 and onwards. As a result of a political agreement of November 2016, the scheme expired at the end of the 2016.

Large enterprises in Denmark are by law required to have a mandatory energy audit every fourth year. The law is no. 345 of 8th of april 2014 “Lov om ændring af lov om fremme af besparelser i energiforbruget, lov om varmeforsyning, lov om kommunal fjernkølig og forskellige andre love”. The law transposes the energy efficiency directive article 8. Denmark has defined large enterprise in accordance with the EU definitions saying there should be more than 250 employees and an annual turnover over 50 m€ or balance over 43 m€. Enterprises with ISO 50,001 or ISO 14,001 are exempt. The deadline for the first energy audits was the 5th of December 2015 and afterwards every fourth year. The scope of the energy audit is buildings, processes and transport. There is no requirement of implementing the energy saving proposals from the energy audits.

As part of a political agreement on economic growth from June 2014 a DKK 40 million (5.4 mio. EURO) fund was established to run a centre for energy savings in enterprises. The money was given for the period 2014-2017. The aim of the centre is to identify and exploit the energy efficiency potential already existing within primarily small and medium sized companies. The large companies are covered by the voulantary agrement scheme and the mandatory energy audit.

TABLE 4.17 MEASURES WITHIN THE BUSINESS SECTOR

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
BU-1: Agreements on energy efficiency with business	Yes*	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Voluntary Agreement, Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1993	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
BU-2: Savings activities by elec. grid, gas, oil and district heating companies (consump. of final energy excl. Transp.)	Yes*	Energy	CO2	Demand management/reduction (Energy consumption)	Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2006	Government:Danish Energy Agency	60 and IE (G1 and G4)	60 and IE (G1 and G4)	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
BU-6: Circular on energy-efficiency in state institutions	Yes*	Energy	CO2	Efficiency improvement in services/ tertiary sector (Energy consumption)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2005	Government:The Danish Energy Agency is responsible for the circular. The individual ministries and state institutions are responsible for the implementation of the circular.	IE (G1 and G4)	IE (G1 and G4)	
BU-7(expired): Campaigns and promotion of efficient appliances (including elec. heating, conversion and efficient appliances in households)	Yes*	Energy	CO2	Efficiency improvement of appliances (Energy consumption)	Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1997	Government:The Minister for Climate and Energy / The Danish Energy Authority	IE (G1 and G4)	IE (G1 and G4)	
BU-8(expired): Renewables for the industry	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2013	Government:Danish Energy Agency, other state authorities, enterprises	1000	IE (G1)	The estimate for 2020 shown here is a former separate estimate for this measure. Although this measure has expired it is still included in the list as some effect of the implementation carried out before expiration remain. But this has not been quantified separately. The separate estimate shown here is not included in the calculation of the total effect of all measures.
BU-9: Mandatory Energy Audit for large Enterprises	Yes*	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
BU-10: The center for energy savings in enterprises	Yes*	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Danish Eneergy Agency	IE (G1 and G4)	IE (G1 and G4)	
G3: All RE mitigation actions (Renewable Energy) since 1990	Yes*	Combined (EN-2, EN-3, EN-4, EN-5, BU-8 and TR-8)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	22805	24060	Estimated in 2017 - sse Annex B4.
G4: All EE mitigation actions (Energy Efficiency) since 1990	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7; EN-1; BU-1, -2, -6, -7, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -10, -11, -12; HO-1, -2, -3, -4, -5, -6)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	16944	18793	Estimated in 2017 - sse Annex B4.

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.
** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.5.1.9 Specific measures in the Transport sector

In 2015, the transport sector was responsible for 25.7% of Denmark's total greenhouse gas emissions. The emissions from the transport sector are primarily CO_2 with a share of 98.8% of transport emissions. Nitrous oxide makes up approximately 1.1% and methane about 0.1%.

In 2015, the transport sector's energy consumption - primarily oil products - made up nearly 30% of total energy consumption in Denmark. The consumption of energy for transport has increased by approximately 23 % since 1990. The most recent baseline scenario from March 2017 predicts a 0.1% reduction in the sector's CO_2 emissions from 12.336 million tonnes in 2015 to 12.325 million tonnes in 2020. Increasing demand for road traffic thus is compensated for by improved fuel efficiency in the car fleet.

Table 4.18 shows the existing policies and measures within the transport sector. A number of important steps have been taken by the European Union. Most important of all is probably the EU's requirements on average CO_2 emissions for passenger cars and vans, i.e. the mechanism imposing fines on manufacturers if they fail to comply with the CO_2 targets.

In the 2016 projection, road traffic measured in vehicles kilometres is estimated to grow at a rate of approximately 1,5 % per year until 2035.

CO_2 measures at EU level and Danish measures aimed at reducing the transport sector's CO_2 emissions are described under the measures section below.

The national environmentally motivated measures for the transport sector, which have also influenced CO_2 emissions, are usually characterised by aiming at limiting environmental impacts in general. The registration tax and the annual tax (the green owner tax) which is dependent on the energy efficiency of the vehicle as well as fuel taxes are assessed to have had considerable effects on CO_2 emissions.

Transport in itself has a number of side-effects in addition to contributing to the greenhouse effect through higher CO_2 emissions, for example air pollution causing poor air quality or acidification, noise, accidents and congestion. It is thus important to note that the various initiatives implemented in the transport area typically address many of these aspects as well - and thus cannot only be considered in relation to CO_2 emissions. In general the increasing traffic intensity has not caused increased CO_2 emissions from transport, while other pollution emissions have fallen significantly. Other negative effects of transport have also been reduced. The number of fatalities in accidents has been reduced from 331 in 2005 to 178 in 2015.

From 2012 all petrol and diesel for transport sold in Denmark must contain an average of 5.75% of biofuels, which must live up to the EU sustainability criteria. According to the Energy Agreement of March 2012 a 10 percent target is foreseen by 2020, however this will depend on further analysis of alternative instruments carried out by 2017. This will probably lead to a lower blending mandate.

Cars with high energy efficiencies, such as electric vehicles, are granted large reductions in the registration tax. Electric vehicles are furthermore granted deductions in the registration tax until 2020.

In 2013, the former government decided to allocate the future proceeds from a change in the oil industry taxation to improve the rail infrastructure in Denmark. The upgrade is expected to reduce travel times substantially. Given the current, lower oil-prices and therefore the reduction in income from taxation, the current government has made a review of the planned investments. This has resulted in a lower level of investment where the electrification of the main lines and the regional lines on Zealand has been given priority.

The tunnel under the Fehmarn Belt will reduce CO_2 emissions by potentially 200,000 tonnes per year. This is mainly due to the following effects:

1. Rail freight trains will reduce the travel distance by 160 km

2. Rail transport for passengers and freight will be strengthened

3. The current ferry service between Rødby and Puttgarden is expected to cease operation.

TABLE 4.18 MEASURES CURRENTLY IN FORCE AIMED AT LIMITING CO_2 EMISSIONS FROM THE TRANSPORT SECTOR

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
TR-1a: EU demands on vehicle manufactures to deliver fuel efficient cars and vans	Yes*	Transport	CO2	Efficiency improvements of vehicles (Transport)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2000	Other:European Commission	600 and IE (G1, G4 and G5)	600 and IE (G1, G4 and G5)	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
TR-1b(expired): Information campaign on fuel consumption of new cars	Yes*	Transport	CO2	Demand management/reduction (Transport), Improved behaviour (Transport)	Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2000	Government:Denmark`s Road Safety and Transport Agency	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TR-2(expired): Energy-correct driving technique	Yes*	Transport	CO2	Improved behaviour (Transport)	Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2000	Government:Ministry of Justice	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TR-3(expired): Initiative on enforcing speed limits	Yes*	Transport	CO2	Improved behaviour (Transport)	Information, Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Justice	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TR-4(expired): Establishment of intermodal installations	Yes*	Transport	CO2	Modal shift to public transport or non-motorized transport (Transport), Improved behaviour (Transport)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Transport and Energy, municipalities, Danish State Railways (DSB)	IE (G1 and G4)	IE (G1 and G4)	
TR-5(expired): Promotion of environmentally friendly goods transport	Yes*	Transport	CO2	Modal shift to public transport or non-motorized transport (Transport), Demand management/reduction (Transport), Improved behaviour (Transport)	Economic, Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Danish Environmental Protection Agency, Haulage contractors	IE (G1 and G4)	IE (G1 and G4)	
TR-6(expired): Reduced travel times for public transport	Yes*	Transport	CO2	Modal shift to public transport or non-motorized transport (Transport), Demand management/reduction (Transport)	Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Transport and Energy and Danish State Railways (DSB)	IE (G1 and G4)	IE (G1 and G4)	
TR-7: Spatial planning	Yes*	Transport	CO2	Low carbon fuels/electric cars (Transport), Demand management/reduction (Transport), Improved transport infrastructure (Transport)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2000	Local:Municipalities	IE (G1 and G4)	IE (G1 and G4)	
TR-8: EU requirements regarding biofuels	Yes*	Transport	CO2	Low carbon fuels/electric cars (Transport)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2012	Government:Danish Energy Agency	290 and IE (G1 and G3)	290 and IE (G1 and G3)	Estimates in 2017 - based on The 2013 Analysis of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
TR-9(expired): Transport infrastructure projects in the fields of electric vehicles, gas and hydrogen	Yes*	Transport	CO2	Low carbon fuels/electric cars (Transport), Improved transport infrastructure (Transport)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Transport	IE (G1)	IE (G1)	
TR-10: Electrification of parts of the rail infrastructure	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Adopted	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Transport	IE (G1)	IE (G1)	
TR-11(expired): Investments in a new metro line and bicycle transport facilities.	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Transport, Local:Municipality of Copenhagen	IE (G1)	IE (G1)	
TR-12: Investment in a tunnel under the Femern Belt	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Adopted	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2028	Government:Ministry of Transport	-300	200	Estimates for the construction phase (emissions of 300 kt CO2eq/year) and operation phase (reduktion of 198.5 kt CO2eq/year) in the 2013 EIA for the project, Chapter 19 (https://www.trm.dk/da/publikationer/2013/vvm-for-femern-baelt).
G5(new): Energy effciency in transport by passenger cars	Yes*	Combined (TD-6, TR-1a, TR-1b, TR2 and TR-3)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	550	550	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.5.1.10 Specific measures in the residential sector

In 2015, the residential/household sector contributed to Denmark's total national greenhouse gas emissions with 2.2 million tonnes of CO_2 equivalents, corresponding to a share of 4.5%. The residential sector in the greenhouse gas inventory only includes CO_2 emissions from burning of oil and natural gas since emissions from production of electricity and district heating used by households are attributed to the plants where the electricity and heat is produced.

Approximately 92% of greenhouse gas emissions from the residential sector in 2015 consisted of CO_2. There are also small emissions of methane and even smaller emissions of nitrous oxide.

In this section measures addressing all types of energy consumption in the household sector are described, although some of the energy savings will result in emission reductions in the energy production sector.

The consumption of energy by households, including electricity and district heating, is responsible for almost 30% of the total final energy consumption in Denmark.

The largest part of the energy consumption is used for heating homes, where burning of oil and natural gas results in CO_2 emissions. A large part of the space heating is in the form of district heating (in 2015 63.2 pct. of heat installations and 48 pct. of net heat demand), which results in CO_2 emissions in connection with the production of district heat. When district heat is produced at CHP plants or with CO_2-friendly fuels, particularly renewable energy, there are big CO_2 savings overall from use of district heating instead of individual heating based on, for example, oil-fired boilers.

Danish households also have a substantial consumption of electricity. Most of the household consumption of electricity is by household appliances and light sources, whereas a decreasing amount of electricity is by electric heating. The electricity consumption for heat pumps are increasing. Consumption for electric heating has been almost constant in recent years as a consequence of the conversion from electric heating to district heating and natural gas heating.

Households' disposal of waste also contributes to emissions of methane from landfill sites.

The action being taken on households' waste and transport consumption is described in the sections on waste and transport. This section therefore concentrates on the possibilities of reducing the CO_2 emissions through savings in electricity and heating in households and the possibilities for conversion to more environment-friendly forms of heating. The possibilities for reduction in the public energy supply system are described in the section on the energy sector.

In 2015, the final energy consumption in the household sector was 158.1 PJ for space heating and hot water (climate-corrected) and 31.4 PJ of electricity for appliances, etc. Consumption for heating has been quite constant for a number of years, in spite of an increase in the number of households and in the area heated. The consumption of electricity for appliances, etc. is still increasing. The increase in the consumption of electricity has, however, not been nearly as great as the increase in the number of appliances, since these have become steadily more energy efficient.

With a view to reducing energy consumption and environmental impacts from the household sector, a wide range of initiatives have been launched, as described in Table 4.19 in order to promote:

- Electricity savings,
- Savings in energy consumption in space heating, and
- Fuel conversion (from electric heating and the use of oil to district heating and the use of renewable energy).

Several concrete measures and incentives already implemented are described below.

Energy taxes

All energy consumption for space heating as well as other energy consumption in households and the public sector, as well as non-VAT-registered businesses is subject to energy taxes. Throughout the 1990s CO_2 and energy taxes have steadily increased, but since 2002 they have been almost stable. The increases have mainly affected households, helping to reduce their energy consumption.

CO_2 taxes

All energy consumption in households is subject to CO_2 taxes. The CO_2 tax is further described in section 4.3.3.

Energy labelling of buildings

Denmark has long experience with energy efficiency and energy savings in buildings. From 1990 to 2015 energy consumption for heating has been reduced by 17.5% per m^2. The goal is to reduce energy consumption in new buildings by 75% by 2020 relative to 2006. The Danish reduction goals for energy consumption in buildings toward 2030 are in progress right now.

The benefits of reducing energy consumption are tangible: less fossil fuel is consumed and the environment has improved substantially. Strict and progressively tightened building regulations since 1977 have ensured a stable demand for energy-efficient building technologies.

Energy labelling of buildings when built, sold or rented

Energy labelling of buildings must be implemented after finishing the construction of a building and on the sale or rental of the building - primarily heating consumption. This applies in principle for all buildings, irrespective of size, apart from production facilities, factories etc.

Regular energy labelling of large buildings and public buildings

Energy labels and an energy plan must be prepared regularly every seven to ten years for all large buildings over 1,000 m^2 and for all public buildings over 250 m^2.

Minimum energy requirements and energy labelling of appliances

Energy labelling (A-G) of white goods, lighting, air con etc. is compulsory within the EU. The European Community also has mandatory energy requirements for some energy-consuming products, such as electric motors, circulators, white goods etc. There are also voluntary labelling schemes (Energy Star, Energy Arrow, windows, boilers) for a number of products. Danish authorities play an active role both in negotiation of the requirements and in securing compliance with the compulsory requirements. The Danish Energy Agency offers advice on its website to end-users in order to promote energy-efficient appliances and products.

Information initiative towards private households

In March 2012 the Centre for Energy Savings was replaced by an information initiative placed at the Energy Agency. The main target of this initiative is to promote energy-efficient products and solutions. The measures of the initiative will be information campaigns, web-based information for private households etc.

Heat pumps as an energy service

In 2016-2019 the measure *Heat pumps as an energy service*, is implemented. The purpose of the initiative is to facilitate a market for energy services based on heat pumps where energy companies install, finance, run and maintain heat pumps installed in houses and in industry. In return the customer pays for the heat delivered by the heat pump. Thereby heat pumps as an energy service imitates the way that district heating has been deployed and driven in urban areas.

The initiative is targeting mainly areas without supply of natural gas or district heating.

"Better Houses"

"BetterHouses" is a scheme (voluntary and market-driven system) from the Danish Energy Agency focusing on energy renovation of buildings. The aim is to make it easier for owners of buildings, mostly homeowners, to energy renovate by creating a "one stop shop" for energy renovation, where the owner only has to contact one certified building contractor and to get an overall counselling on energy renovation of the entire building. Skilled workmen are educated under the BetterHouses program to be advisors on energy renovation. The Danish Energy agency approves the BetterHouses firms and professionals like architects, engineers, craftsmen, energy consultants and building designers can take training courses to become BetterHouses advisors. The training is carried out at academies of higher education. A Better Houses advisor can manage the process and can follow the project all the way from plan to completed renovation.

Strategy for energy renovation of buildings

The former government adopted in May 2014 a strategy for energy renovation of buildings, most of the initiatives is implemented or in the process of being implemented. The strategy contains initiatives which will promote the renovation of the Danish building stocks and insures that energy efficiency measures are implemented on the buildings. It is expected, that the effect of the strategy on energy consumption will be a reduction of net energy consumption for heating and hot water with 35 pct. in 2050 compared with 2014. The strategy includes following initiatives:

- Revision and upgrade of building regulations and energy requirements that applies to renovation and retrofitting of existing buildings
- Information to building owners, construction companies, financial institutions etc. on energy how to improve energy efficiency
- Revision of the energy certificates scheme to improve the efficiency of the scheme
- Promotion of the ESCO-concept (ESCO: Energy Service Companies)[8]
- Promotion of energy efficiency in public buildings

- Measures to improve professional training to craftsmen and engineers in the building sector
- Development and demonstration of new technologies.

In March 2012 the former government and a broad majority in Parliament concluded a comprehensive Energy Agreement with several new measures for the period until 2020. The background for the agreement is the long-term objective that Danish energy consumption is to be solely based on renewable energy sources. In 2050 there is to be no use of fossil fuels. One of the key ambitions in the agreement is to further improve energy efficiency and energy savings.

TABLE 4.19 MEASURES WITHIN THE HOUSEHOLD (RESIDENTIAL) SECTOR TO REDUCE EMISSIONS OF GREENHOUSE GASES

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
HO-1: Energy labelling of small and large buildings (incl. public sector and business)	Yes*	Energy	CO2, CH4, N2O	Efficiency improvements of buildings (Energy consumption)	Regulatory, Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1997	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-2: Energy labelling of electric appliances	Yes*	Energy	CO2	Efficiency improvement of appliances (Energy consumption)	Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1992	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-3: Substitution of individual oil-based furnaces	Yes*	Energy	CO2	Switch to less carbon-intensive fuels (Energy supply), Efficiency improvements of buildings (Energy consumption)	Economic, Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2010	Government:Danish Energy Agency	20 and IE (G1 and G4)	20 and IE (G1 and G4)	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
HO-4: Better Houses	Yes*	Energy	CO2	Efficiency improvements of buildings (Energy consumption)	Information	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-5: Strategy for Energy renovation of buildings	Yes*	Energy	CO2	Efficiency improvements of buildings (Energy consumption)	Information, Education, Research	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-6 (new): Heat pumps as an energy service	Yes*	Energy	CO2	Efficiency improvements of buildings (Energy consumption), Increase in renewable energy (Energy supply)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2016	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
G4: All EE mitigation actions (Energy Efficiency) since 1990	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7; EN-1; BU-1, -2, -6, -7, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -10, -11, -12; HO-1, -2, -3, -4, -5, -6)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	**16944**	**18793**	Estimated in 2017 - sse Annex B4.

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.
** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.5.2 CH_4 (methane)

Total emissions of methane from the energy sector account for about 1.1% of the sector's greenhouse gas emissions, corresponding to about 0.5 million tonnes CO_2 equivalents. Many small sources contribute to this overall relatively minor source of greenhouse gas emissions. The biggest single contribution comes from gas-fired CHP plants, which emit unburnt natural gas. With a view to minimising the emissions, a 1998 Statutory Order, in force from 2006 to 2013, has limited emissions of nitrogen oxides, unburnt carbon hydrides, including methane, and carbon monoxide etc.. However, the limit value for unburned hydro carbons was removed in a revision of the Statutory Order entering into force on 7 January 2013.

4.3.5.3 N_2O (nitrous oxide)

Nitrous oxide accounts for 0.8%, or 0.4 million tonnes CO_2 equivalents, of the energy sector's total greenhouse gas emissions. Within energy, emissions of nitrous oxide from transport have increased since the introduction of new cars with catalytic converters in 1990. However, as the population of cars from before 1990 is almost zero today, no further increase in specific nitrous oxide emissions from cars with catalytic converters is expected.

4.3.6 Industrial Processes and Product Use

The greenhouse gas emissions from industrial processes and product use made up 4% of Denmark's total greenhouse gas emissions in 2015 (without LULUCF), of which CO_2 was the primary emission. 62% of the sector’s emissions are CO_2, primarily from cement production, and 37% are emissions of the industrial gases HFCs, PFCs, and SF_6.

4.3.6.1 CO_2 - Cement production

Cement production results in large emissions of CO_2. The production process itself is very energy-intensive, and a large quantity of CO_2 is emitted in connection with the production process.

Cement production in Denmark is concentrated in a single company. About half of the emissions come from the company’s energy consumption and the other half from chalk, which is one of the raw materials used in the process. A lot has been done within the cement industry. For example, in the last 20 years the Danish cement producer has significantly reduced its CO_2 emissions per tonne cement produced.

Since 2005, all CO_2 emissions from cement production in Denmark are subject to the EU ETS.

4.3.6.2 N_2O - Production of nitric acid

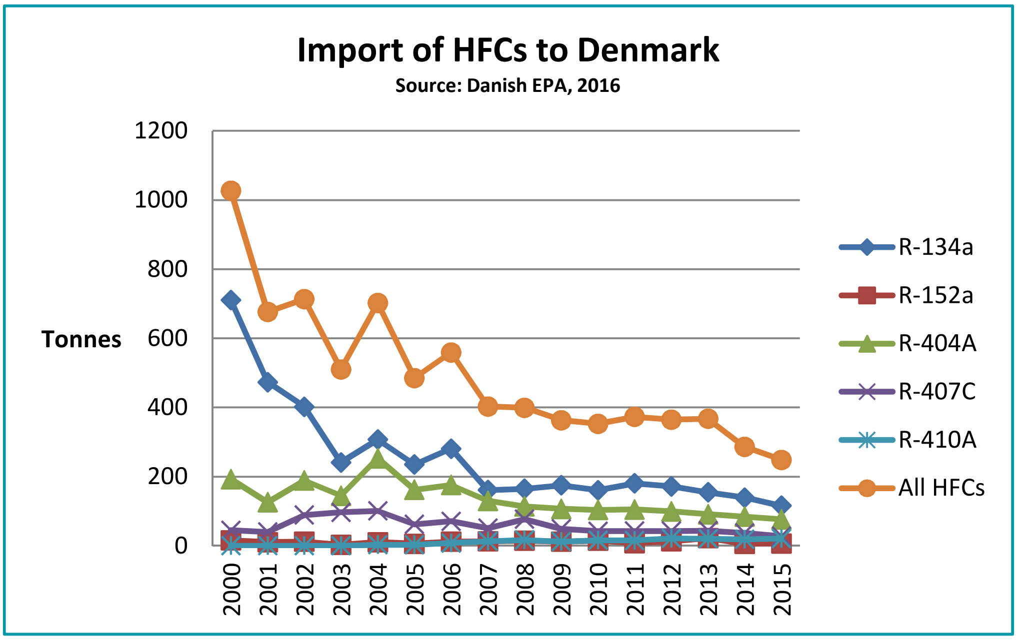
The emission of nitrous oxide (N_2O) from the production of nitric acid in connection with the production of fertilizer in Denmark has only been included in Danish emissions inventories in recent years, even though production from the single plant in Denmark, with associated emissions, has taken place for many years, including 1990, Denmark’s basis year for emissions of nitrous oxide.

In summer 2004, however, the owner decided to stop production of fertilizer and so production of nitric acid in Denmark. Emissions of nitrous oxide from production of nitric acid in 2003 corresponded to 0.9 million tonnes CO_2 equivalents. In 2004 emissions were about one-half of this, and from 2005 they ceased entirely cf. market conditions for production of fertilizer in Europe.

4.3.6.3 HFCs, PFCs and SF_6 - Consumption of these substances

Emissions of the so-called industrial gases HFCs, PFCs, and SF_6 are in accordance with the emission inventories included in the industrial sector. This is also the case for emissions from other sectors during use and scrapping of equipment containing HFCs, PFCs and SF_6. These gases are used for several purposes including as refrigerants and blowing agents, etc. (HFCs) and insulator gas in high voltage switchgear (SF_6). Since there is no production of these gases in Denmark, all emissions are related to the import of the substances. The developments in imports of chemical mixtures containing HFCs in recent years are shown in Figure 4.10.

FIGURE 4.10IMPORT OF HFCS TO DENMARK 2000-2015 IN TONNES HFCS
Source: Danish Environmental Protection Agency



The Danish regulation of emissions of the industrial greenhouse gases (HFCs, PFCs, and SF_6) is 2-phased, since there is a consumer tax on the use of the substances and also a statutory order on the phasing out use of the gases in new facilities and products. Both measures are further described below.

According to model-based calculations, the combined effect of taxation and regulation of F-gases compared to a business as usual scenario starting in 2000 is an approximately 1.4 million tonnes of CO_2 equivalents reduction in annual F-gas emissions in 2020. The accumulated emission savings over the period from 2000 to 2020 is estimated at approximately 11.2 million tonnes of CO_2 equivalents.

4.3.6.3.1 *Taxes on HFCs, PFCs and SF_6*

Taxes corresponding to their GWP have been imposed on each of the greenhouse gases from March 2001 in combination with the Danish CO_2 tax of DKK 0.15 per kg CO_2 as described in section 4.3.3. This means that HFC-134a is subject to a tax of DKK 215/kg, as it has a GWP of 1,430. There is a ceiling of DKK 600/kg so although SF_6 has a GWP of 23,900, the tax is only DKK 600/kg and not DKK 3,585/kg.

The tax is imposed on the substances on importation because none of them is produced in Denmark. The tax is payable whether the substances are imported as pure substances or as part of imported products. If the content in the products is not known, the tax is based on a fixed tariff.

The tax is payable on a wide range of products, including:

- Refrigerating and freezing plants
- Air-conditioning plants
- PUR foam for cooling plants, district heating pipes, insulated gates and doors, panels for refrigeration and freezer rooms, extruded polystyrene for insulation (XPS foam), jointing foam
- Spray canisters
- Insulation gas

The tax is also payable on services on existing and new installations/products.

4.3.6.3.2 *Regulation of HFCs, PFCs and SF_6*

On 15 July 2002, a statutory order on the regulation of certain industrial greenhouse gases came into force.

This Statutory Order includes a general ban on the use of industrial greenhouse gases in a great number of new facilities and products from 1 January 2006, including household cooling and freezing appliances, PUR foam, etc. However, some products and applications are exempted from the ban. This applies, for example, to servicing existing plants, mobile cooling plants, including mobile air conditioning plants, the use of HFCs in cooling and air conditioning plants with fillings between 0.150 and10 kg HFC, SF_6 in high voltage plants, etc. The Statutory order was revised in May 2017 in order to reflect the development of new low GWP, fluorinated refrigerants such as HFOs. The only change is that the revised order does not cover HFCs with a GWP below 5. All other provisions remains unchanged.

To ensure the best possible implementation of the phase-out dates for the refrigeration sector, a total of DKK 12 million was reserved for the period 2005-2007 for development of alternatives and for subsidies for implementation of the alternatives developed in the previous years. A knowledge centre for HFC-free cooling has been established. This centre disseminates knowledge and offers technical assistance.

As from 2015 to 2017 DKK 1,5 million is reserved for promoting cooling equipment relying on natural refrigerants and retrofitting existing equipment to use refrigerants with lower GWP.

To ensure regeneration and environmentally friendly destruction of newly developed flammable fluorinated refrigerants DKK 2.5 million is granted from 2017 to 2019 to upgrade the existing return system (see Chapter 4.3.4).

An overview of the above measures regarding industrial processes is given in table 4.20[17].

TABLE 4.20 MEASURES IN INDUSTRIAL PROCESSES

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
IP-1: Regulation of use of HFCs, PFCs and SF6 (phasing out most of the uses)	Yes*	Industry/Industrial processes	HFCs, PFCs, SF6	Reduction of emissions of fluorinated gases (Industrial processes)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2006	Government:Danish Environmental Protection Agency	IE (G1 and G6)	IE (G1 and G6)	
G6(new): F-gas taxes and regulation	Yes*	Combined (TD-8 and IP-1)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	**800**	**800**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.7 Agriculture

The primary occupational sectors agriculture, forestry and fisheries are generally considered as one single economic sector in Denmark, although the importance of the individual sectors differs greatly with respect to Denmark's emissions and uptake of greenhouse gases. Agricultural farms have emissions of primarily methane and nitrous oxide as described in this section. Liming, urea application and other carbon-containing fertilizers are minor sources of CO_2 emissions. The CO_2 emissions by sources and removals by sinks in relation to Denmark's agricultural soils and forests are included under the LULUCF sector described in Section 4.3.7. CO_2 emissions from energy use in agriculture are included under energy (section 4.3.4).

In 2015, emissions of greenhouse gases from agriculture (i.e. excluding CO_2 from cropland and grassland under the LULUCF sector) were responsible for 21.3% of Denmark's total greenhouse gas emissions (total excluding LULUCF, but with indirect CO_2). Total greenhouse gas emissions from agriculture consisted, in 2015, of 53.6% from methane, 44.6% from nitrous oxide and primarily from liming 1.7% CO_2 emissions. Agriculture is the overall most important sector regarding emissions of N_2O and CH_4. In the same year, the contribution of N_2O and CH_4 from agriculture to the national total emission of these gases was 88.1% and 80.0%, respectively. N_2O emissions decreased by 28.5% and the CH_4 emissions decreased by 1.1% from 1990 to 2015 (*Nielsen et al., (2017a)*).

Table 4.21 shows measures for greenhouse gas emission reductions within agriculture.

Policies and measures relevant for the agricultural sector which have affected or will affect the sector's greenhouse gas emissions are:

- Ban on burning of straw on fields
- Action Plans for the Aquatic Environment I and II and Action Plan for Sustainable Agriculture
- Action Plan for the Aquatic Environment III
- Ammonia Action Plan
- Action Plan for Joint Biogas Plants and subsequent follow-up programmes, including the New Energy Policy Agreement
- Environmental Approval Act for Livestock Holdings
- Agreement on Green Growth 2009
- Agreement on Green Growth 2.0
- Subsidy for conversion of arable land on organic soils to nature
- Political Agreement on a Food and Agricultural Package
- Agreement on Nature (the Nature Package)
- National Green Climate Fund – Initiatives in agriculture 2017.

4.3.7.1 ***CH_4 (methane)***

Methane emissions mainly steams from the agricultural sector, contributing, in 2015, with 80% of total Danish CH_4 emissions, corresponding to 5.5 million tonnes CO_2 equivalents (*Nielsen et al., (2017a)*). The methane is formed through enteric fermentation in farm animals and from conversion of carbohydrates in manure.

Danish agriculture's biggest contribution to the methane emissions comes from dairy cows.

In the digestion process, methane is a by-product of the fermentation of feed in the rumen, primarily from grass and roughage fodder. In addition, methane is formed during conversion of manure under anaerobic conditions if the temperature is sufficiently high. These conditions normally occur in manure stores and housing systems with liquid manure or deep litter.

The emission of methane from agriculture has remained more or less stable in the period from 2003 to 2015. At present, the number of dairy cows in Denmark is projected to increase slightly in combination with an increased milk production per dairy cow, which again cause the feed intake and thus the methane emissions from enteric rumen fermentation to rise. At the same time, the CH_4 emissions from manure is expected to slightly decrease due to an increasing share of the manure expected to be treated in biogas plants or acidified during storage.

4.3.7.1.1 Biogas

Biogas from digestion of manure and organic wastes carries a number of advantages when used to substitute fossil energy: reductions in emissions of greenhouse gases, better utilization of manure as fertiliser, recycling and use of organic wastes for energy and fertiliser purposes etc.

In order to stimulate expansion of the biogas sector the subsidy on the sales price of electricity production based on biogas was adjusted by the Energy Policy Agreement of 22 March 2012. The Agreement resulted in an amendment to the Promotion of Renewable Energy Act of 27 December 2008.

The Energy Policy Agreement continued funding biogas for combined heat and power (CHP) and introduced subsidy equality so that biogas sold to the natural gas grid would receive the same subsidy as biogas used at CHP plants. In addition the agreement also introduced a new subsidy when biogas is used in industrial processes, as a fuel for transport or for the production of heat.

Finally, as part of the Danish Rural Development Programme 2007-2013, financial aid has been provided to investments in biogas plants in 2010 and in 2012. In 2012 support was awarded to both new and existing biogas plants to the amount of DKK 262 million.

Consequently the latest projection from the Danish Energy Agency expects an increase in biogas production from 3.9 PJ in 2007 to 13.8 PJ in 2020 from agricultural sources – i.e. the major part of total production of 15.4 PJ from all biogas plants (Denmark's Energy and Climate Outlook 2017, Danish Energy Agency, March 2017)[9]. With this, a five to six fold increase in the volume of manure used for biogas generation before 2020 is expected.

The biogas production is expected to result in a reduction of the annual emissions of methane and CO_2 by approximately 0.9 million tonnes of CO_2 equivalents by 2020 including the reduced CO_2 emissions from substitution of fossil fuels, primarily natural gas. Reduction in the emission of nitrous oxide is not included in this figure. The expected effect was re-estimated in September 2016 by DCE[10].

As mentioned in chapter 4.3.4, the 1st allocation of the budget under the National Green Climate Fund in June 2017 included an earmarking of 9,0 million DKK for developing solutions in existing biogas plants and associated suppliers of feedstock with a view to reduce the retention time of manure. This is expected to increase the production of biogas per unit input of manure while at the same time reducing emissions of methane. The expected effect of this initiative is not included in the GHG emission projection from March 2017.

4.3.7.2 N_2O (nitrous oxide)

Agriculture is the largest source of nitrous oxide emissions in Denmark. Of the total Danish N_2O emissions of 5.3 million tonnes CO_2 equivalents in 2015, 88% or 4.6 million tonnes of CO_2 equivalents came from agriculture (*Nielsen et al., (2017a)*). The process of emission of N_2O occurs in some types of manure storage facilities and during conversion of mineral and organic bound nitrogen (e.g. in manure and applied wastewater sludge) in the soil. Some of the leached nitrogen is also converted into nitrous oxide. Nitrogen entering the soil with applied fertiliser and manure, and through plant residue, is the main sources of nitrous gas emissions.

Likewise, ammonia (NH_3) volatilisation contributes to the greenhouse effect because some of the ammonia nitrate ends up as nitrous oxide in the atmosphere. Ammonia volatilisation into the atmosphere stems almost exclusively from agriculture, through conversion processes from manure, fertiliser, sludge, crop residue and treatment of straw with ammonia. In particular, the emissions occur during handling of manure in animal housing, during storage and transport of manure, and from grazing animals[11] (*Nielsen et al., (2017a)*).

The main reason for the drop in the overall emissions of N_2O from the agricultural sector of 28% from 1990 to 2015 is enforced legislation (see below) to reduce nitrogen leaching by improving the utilisation of nitrogen binding in manure, as well as measures to reduce the application of mineral fertilizers to soils. The legislation has resulted in less nitrogen excreted per unit livestock produced, as well as a considerable reduction in the use of mineral fertilisers. The basis for the N_2O is then reduced (*Nielsen et al., (2017a)*). Implementation of the Action Plans for the Aquatic Environment II and III contribute the most to this reduction[12,13]. Further projected decrease in N_2O emissions towards 2020 is mainly attributed to areas being taken out of agricultural production for urban development and infrastructure etc., and to anticipated increased shares of organic agriculture (DCE, December 2014).

In 2016, the Political Agreement on a Food and Agricultural Package from 2015) allowed Danish farmers to use more nitrogen in the fields through a lifting of the reduced fertilizer standards for nitrogen. The potential slight increase in future N_2O emissions resulting from this policy change is sought mitigated by correspondingly implementing measures for ensuring optimization of N-binding and carbon sequestration in agricultural soils (e.g. catch crops).

4.3.7.2.1 Action Plans for the Aquatic Environment I and II and Action Plan for Sustainable Agriculture

One of the main purposes of the Action Plans for the Aquatic Environment and the Action Plan for Sustainable Agriculture was to reduce agriculture's nutrient losses to the aquatic environment.

The action plans was implemented as regulation of farmers' behaviour. The Action Plan for the Aquatic Environment I was initiated in 1987, and the Action Plan for Sustainable Agriculture in 1991. In particular, these action plans included requirements concerning closed periods for applying slurry, ensuring a better utilisation of manure as well as minimum slurry storage capacity, mandatory incorporation of manure into the soil shortly after application, and winter green fields. The Action Plan for the Aquatic Environment II from 1998 contained a number of additional measures, including re-establishment of wetlands, afforestation, agreements on environment friendly agricultural measures, establishment of organic farming on an additional 170,000 ha, improved utilization of fodder, reduced animal density, use of catch crops, reduced fertilisation norms, and increased efficiency in use of nitrogen in manure. The aim of the political plans, which has now been reached, was to reduce nitrogen leaching by 100,000 tonnes N/year up to the year 2003[14]. The benchmark for the evaluation of the agricultural nitrogen leaching, as part of the final evaluation of the Action Plan for the Aquatic Environment II in December 2003, was 311,000 tonnes N per year. The evaluation showed that measures already implemented in addition to the measures agreed upon and financed by Action Plan II would result in a reduction of the total nitrogen leaching from agriculture (root zone and stable and storage facilities) of around 149,000 tonnes N per year. This corresponds to a reduction of around 48% of 311,000 tonnes N. After taking into account the calculation uncertainties, the nitrogen discharge reduction goal of 49% was achieved.

Specifically, these action plans have reduced the emissions of nitrous oxide. There have presumably also been small effects on methane emissions from manure stores, particularly as a consequence of increased use of anaerobic fermentation of manure in biogas plants. The increased use of catch crops and larger overall areas with organic farming would also be expected to lead to an increased storage of carbon in the soil.

Most of the changes in nitrous oxide emissions from agriculture through the period since 1990 can be attributed to these action plans. However, it has been calculated that even without the action plans there would have been a reduction in emissions, although to a much lesser extent, due to an overall optimization and improvement of farming techniques and management practices. The effect of these action plans on emissions of nitrous oxide has been calculated at about 2.2 million tonnes CO_2 equivalents/year[19]. There are no estimates of the effect of the Action Plans I and II for the Aquatic Environment and the Action Plan for Sustainable Agriculture on carbon storage in the soil.

4.3.7.2.2 The Ammonia Action Plan

Ammonia emitted from agriculture will stimulate emissions of nitrous oxide when it is deposited in other ecosystems. Reducing ammonia evaporation will therefore also result in a reduction of nitrous oxide emissions. Together with the Action Plans for the Aquatic Environment I, II and III, the Ammonia Action Plan, which was adopted in 2001 carried a projected reduction of ammonia emissions by an estimated 15-20,000 tonnes of nitrogen annually. Hence, ammonia evaporation from agriculture should be reduced from 90,000 tonnes of nitrogen in the mid-1990s to approximately 60,000 tonnes of nitrogen in 2004.

The measures covered by the Ammonia Action Plan are:

1) Optimisation of manure handling in stables for cattle, pigs, poultry and fur animals.
2) Rules on covering storage facilities for solid manure and slurry tanks.
3) Ban on overall surface spreading and reduction of the time from field application of manure to incorporation in soil.
4) Ban on ammonia treatment of straw.

Following from an evaluation, these measures are estimated to have led to a reduction in emissions of nitrous oxide corresponding to 34,000 tonnes of CO_2 equivalents annually in 2010 and thereafter. A shorter period of exposure for spread manure have had the greatest effect with an estimated reduction of 13,000 tonnes of CO_2 equivalents annually[20].

4.3.7.2.3 Action Plan for the Aquatic Environment III and the agreements of Green Growth

With the political agreement on the Action Plan for the Aquatic Environment III (APAE III) of 2 April 2004, a number of measures were implemented to follow up on the results attained via the previous plans. This third action plan contains targets with respect to nitrogen, phosphorus, sensitive natural areas, and slurry odour. It is a 10-year agreement, and was, in 2008 and 2011, evaluated with respect to the Water Framework Directive and the Habitats Directive. Special emphasis in the APAE III was on the use of catch crops, stricter requirements for use of manure as well as afforestation and agro-environmental measures. In addition, the agreement includes research initiatives aimed at slurry odours and reduction of emissions of nutrients, e.g. research into technology to manage slurry, ammonia etc. The effect of the action plan for the period 2008-2012 was projected at 0.2 million tonnes CO_2 equivalents/year[15].

In 2008 the APAE III was evaluated on results, adequacy of tools and economic aspects to ensure that activities and expected results were achieved. The main conclusions for a number of measures were that implementation and effects have not been as anticipated. At the midterm evaluation of the APAE III, covering the years 2004-2007, no reductions in the production of animal manure were recorded, nor any decrease in the use of mineral fertilizers. Furthermore, no significant reductions in nitrogen leaching were proved for the investigated period (Waage Petersen et al., 2008).Thus, no change in the key parameters that provided reduction in the emissions of greenhouse gasses in the earlier action plans for the aquatic environment have happened so far, and it may therefore be difficult to reach the initial target.

In 2009, the Danish government launched the Green Growth Agreement (GGA) – as a plan for ensuring better conditions for nature and the environment while allowing agriculture to develop as a business. The GGA is a long-term plan for Danish nature, environment and agriculture with the purpose of ensuring that a high level of environmental, nature and climate protection goes hand in hand with modern and competitive agriculture and food industries.

The GGA was augmented in 2010 by the Green Growth Agreement 2.0, containing a series of initiatives to improve agriculture and food sector growth conditions and thus help to secure employment on farms, in the food industry and downstream industries. Furthermore, the GGA 2.0 supported the ongoing development of bioenergy with the aim of contributing to support Denmark's target of 30 per cent renewable energy by 2020 and fulfilment of Denmark's climate goals.

The GGA contains targets with respect to discharges of nitrogen and phosphorus to the aquatic environment, protection of nature and biodiversity, development of renewable energy in the agricultural sector including biogas plant, reduction of harmful pesticides, development of the organic sector and strengthened initiatives within research and development within the agricultural and food sectors.

The GGA also dealt with the problems previously encountered in achieving the expected goals through the APAE III. The measures in the GGA likewise pursued the achievements of the objectives of the Nitrates Directive on reducing discharges of nitrogen and phosphorus, as the target in APAE III were included in the GGA target. Different from the former APAE's were also the switch from a target on N leaching from the root zone to a target on N discharge to the aquatic environment. As the GGA worked to implement the EU Water Framework Directive, some measures were targeted sub-catchment while some measures were general rules.

The initiatives incorporated in the GGA were projected to reduce the agricultural sector's overall emissions of greenhouse gases by about 800,000 tonnes of CO_2 equivalents annually. Of this, about 400,000 tonnes reduction were expected to be derived from a green, market-based re-structuring of nitrogen regulation.

The latest estimate of achieved effects of the GGA, as well as of structural developments in agriculture etc., used in the October 2014 WEM greenhouse gas emission reduction projection amounts to 0.5 Mt of CO_2 eq. annually by 2021 (DCE, December 2014). A joint evaluation of the GGA's and the APAE's March 2014 showed an overall reduction effect of approx. 0.19 Mt CO_2 eq. annually for the period of 2007-2011, and approx. 0.337 Mt CO_2 eq. annually for 2012-2015. The reduction of specific emissions for 2007-2011 equals annually an estimated 4 Kt CO_2 eq. from CH_4, 67 Kt CO_2 eq. from N_2O, 107 Kt CO_2 eq. from carbon storage, and 11 Kt CO_2 eq. stemming from reductions in fuel use. Likewise, for the period of 2012-2015 the reductions equals an estimated 179 Kt CO_2 eq. from N_2O, 129 Kt CO_2 eq. from carbon storage, and 41 Kt CO_2 eq. stemming from reductions in fuel use, while emissions stemming from CH_4 rose with 12 Kt CO_2 eq.[16] (DCA 2014).

4.3.7.2.4 Environmental Approval Act for Livestock Holdings

The Environmental Approval Act for Livestock Holdings was implemented on 1 January 2007, providing national minimum requirements for environmental protection (odour, ammonia, nitrate, phosphorous, landscape, etc.) when livestock holdings are established, expanded or changed. The purpose of the Act was also to ensure the use of best available techniques (BAT).

The measures covered by the Environmental Approval Act for Livestock Holdings in 2007 were:

- 300 m buffer zones around ammonia-sensitive areas where no extension of livestock farms can take place if such an extension would lead to increased ammonia deposition in natural areas vulnerable to ammonia.
- Demand for a general reduction of ammonia emissions relative to a production facility with the lowest ammonia emission norm: 2007: 15%, 2008: 20%, 2009: 25%.
- Demands for injection of animal slurry on black soil and grass within buffer zones (1 km from vulnerable natural areas and, from 2011, in the whole country).
- Demand for fixed cover on most new containers for solid manure and slurry tanks (if they are within a distance of 300 meter to neighbours or vulnerable natural areas).
- Environmental standards and limits for nitrate-leaching to surface waters and groundwater depending on vulnerability, e.g. denitrification capacity and standards for phosphorous surplus depending on soil type and drainage.
- Environmental standards and limits for maximum deposition of ammonia on vulnerable nature and maximum odour impact on neighbours and cities.

The effect of these measures on greenhouse gas emissions has not yet been quantified.

The Environmental Approval Act for Livestock Holdings was changed in 2011, and the environmental standards for ammonia were heightened trough several measures. The general reduction goal was increased to a reduction of 30%, the specific ammonia reduction requirements were introduced with a maximum for total deposition to certain ammonia sensitive areas. This replaced the 300 meter buffer zones. In general this led to an overall tightening of the ammonia reduction with local exceptions.

4.3.7.2.5 Political Agreement on a Food and Agricultural Package

In 2015 the Green Growth Agreement was replaced by the Political Agreement on a Food and Agricultural Package (FAP) which ensures better production conditions for farming, while at the same time handling a number of the key environmental challenges.

The agreement includes a diverse package of measures designed to make a shift in the way environmental regulation in the agricultural sector is carried out, from a general regulation to a targeted approach. The fertilization standards for the agricultural sector was lifted to the level of economic optimum and a new targeted regulation based on specific environmental goals for the aquatic environment and ground water resources is introduced from 2019.

The re-establishment of wetlands, rewetting of organic soils and afforestation (conversion of arable land) remain important measures to reduce the loss of nitrogen to the aquatic environment. As a part of the Political Agreement on a Food and Agricultural Package a comprehensive support scheme for catch crops was also introduced. The agreement also included changes to the regulation on the use of catch crops in Danish agriculture: a requirement of catch-crops as compensation for livestock-related nitrogen leaching and additional catch-crops as part of a targeted regulation. The aforementioned regulatory schemes on catch crops were implemented in addition to the already existing two other schemes, covering mandatory catch crops and catch crops as part of the EU requirement of environmental focus area.

Demands on growing catch crops (primarily grass) in the autumn to reduce the nitrate leaching do also sequester CO_2. The area today is >220.000 hectares or 8 % of the agricultural area. Based on plans for future agricultural regulations the area is expected to increase significantly towards 2021.

The overall estimation of effect of the agreement on greenhouse gas emissions (including carbon sequestration) is an yearly increase (calculated with respect to corresponding soil carbon binding) of 287 Mt CO_2 eq. for 2016, 357 Mt CO_2 eq. for 2017, 374 Mt CO_2 eq. for 2018, 287 Mt CO_2 eq. for 2019, and 141 Mt CO_2 eq. for 2020. In 2021, the effect is a net decrease of 11 Mt CO_2 eq., (calculations from Aarhus University (DCA), University of Copenhagen, IFRO, the Ministry of Food and Environment of Denmark, and the Danish Energy Agency). If the soil carbon binding is not included in the assessment, the package will lead to a yearly increase ranging from 247 to 412 kt CO_2 eq. in all years. In these figures are not included an estimated increase in the carbon stock in the agricultural soils due to an expected crop yield increase. See the chapter on the LULUCF sector.

Subsidy for conversion of arable land on organic soils to nature

Cultivated organic soils emits large amounts of CO_2. In Demark approximately 66,000 hectares of organic soils (>12% organic carbon) are under agricultural practice.

In 2014 the Danish Government adopted a subsidy scheme for conversion of arable land on organic soils to natural habitats under the framework of the common agricultural policy (CAP). This scheme is now a part of the Agreement on the Food and Agricultural Packet.

The objective of the scheme is to reduce agricultural emissions of greenhouse gases from organic soils through less intensive agricultural operations. The initiative also offers opportunities for synergies in relation to reduced discharges of nitrogen into watercourses, lakes and fiords as well as for increased biodiversity. From 2015 to 2017 the plan has been to provide economic subsides to convert approximately 2,500 hectares of organic lowland areas into rewetted natural habitats and reduce emissions of greenhouse gases. The CO_2 effect has been estimated at a reduction of at least 33.000 tonnes of CO_2-eq. annually in the period 2014-2017. The effect is likely to be greater due to prioritization of projects with the lowest emission reduction costs (DKK per kg CO_2), depending on soil types[17]. The areas under the subsidy scheme are registered with a ban on cultivation, fertilisation and pesticide application. As a part of the Agreement on the Food and Agricultural Packet the scheme has been extended to 2020. The scheme is co-financed by the Danish rural development by the European Agricultural Fund for Rural Development (EAFRD).

At present, ten projects have been initiated under the programme, with many more applications waiting. Data on the climate effect of the subsidy scheme are expected to become available from 2018.

4.3.7.2.6 Political Agreement on Nature

The Political Agreement on Nature (the Nature Package) was installed in May 2016 with the main aim of supporting an increased protection of biodiversity. The agreement states initiatives within the following areas: Forests for biodiversity, continued agreements for nature, nature and biodiversity, urban nature and outdoors recreation, open land management and the farmer's role as resource manager, modern nature conservation, and simplification of legislation.

The climate effect of this Agreement has not yet been established.

4.3.7.2.7 Bio-refining

Bio-refining can produce a range of products such as inputs to biogas production, protein and fodder and other higher value products for use in e.g. the chemical and pharmacological industry. As mentioned in chapter 4.3.4, the 1st allocation of the budget under the National Green Climate Fund in June 2017 included an earmarking of 8 million DKK as support in 2017 for pilot-scale bio-refinery projects based on non-food biomass. Commercialization of the bio-refining sector can facilitate demand for crops such as grasses with higher associated environmental and climate benefits than for conventional crops like corn or cereals. In addition, bio-refining is considered to be essential in realizing the bio-economy potential within Danish agriculture and other connected sectors.

TABLE 4.21 MEASURES WITHIN AGRICULTURE, FORESTRY AND FISHERIES TO LIMIT EMISSIONS OF GREENHOUSE GASES (SEE ALSO TABLE 4.25 (LULUCF))

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)** 2020	Estimate of mitigation impact (not cumulative, in kt CO2 eq)** 2030	Source of estimates
AG-1(expired): Action Plan for the Aquatic Environment I+II and Action Plan for Sustainable Agriculture	Yes*	Agriculture	N2O	Reduction of fertilizer/manure use on cropland (Agriculture)	Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1987	Government:State, Local:Municipalities	1900	1900	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
AG-2(expired): Action Plan for the Aquatic Environment III	Yes*	Agriculture	N2O	Reduction of fertilizer/manure use on cropland (Agriculture)	Economic, Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2004	Government:State, Local:Municipalities	IE (G1)	IE (G1)	
AG-4a/4b/4c/4d/4e: Reduced emissions of ammonia	Yes*	Agriculture	N2O	Reduction of fertilizer/manure use on cropland (Agriculture), Improved animal waste management systems (Agriculture)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2001	Government:State, Local:Municipalities	IE (G1)	IE (G1)	
AG-4f: Environmental Approval Act for Livestock Holdings	Yes*	Agriculture	N2O, CH4	Reduction of fertilizer/manure use on cropland (Agriculture), Improved livestock management (Agriculture), Improved animal waste management systems (Agriculture)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2007	Government:State, Local:Municipalities	IE (G1)	IE (G1)	
AG-6: Biogas plants	Yes*	Agriculture, Energy	CO2, CH4	Improved animal waste management systems (Agriculture), Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1987	Government:State	240	207	2020: "Biogasproduktions konsekvenser for drivhusgasudledning i landbruget" Rapport nr. 197 DCE, 2016 (http://dce.au.dk/udgivelser/vr/nr-151-200/abstracts/nr-197-biogasproduktions-konsekvenser-for-drivhusgasudledning-i-landbruget/); 2030: Preliminary estimate (to be published, in Danish).
AG-9(expired): Agreement on Green Growth	Yes*	Agriculture, Energy	N2O, CO2, CH4	Reduction of fertilizer/manure use on cropland (Agriculture), Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic, Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2009	Government:State	500	0	The estimate for 2020 shown here is a former separate estimate for this measure. As this measure has been replaced by measure no. AG-12, only the effect estimated under AG-12 is included in the calculation of the total effect of all measures.
AG-11(new+expired): Agreement on Green Growth 2.0	Yes*	Agriculture, Energy	CO2, CH4, N2O	Increase in renewable energy (Energy supply), Reduction of pesticides use (), Reduction of tax on productive farmland (), Conversion to organic farming ()	Economic, Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2010	Government:Ministry of Environment and Food	0	0	Notat nr. 2, Vedrørende effekter af forskellige tiltag i forbindelse med Grøn Vækst, Aarhus Universitet (http://pure.au.dk/portal/files/38211855/010511_DJF_DMU_notat_2_inkl_Baselinegruppens_kommentarer_og_sp_rgsm_l.pdf , in Danish)
AG-12(new): Political Agreement on a Food and Agricultural Package	Yes*	Agriculture	N2O, CO2	Improve the ability of the food and agricultural industry to increase primary production and exports, as well as to contribute to creating growth and jobs, in due interaction with protection of nature and the environment. ()	Economic, Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2016	Government:Ministry of Environment and Food	-122	-122	Answer to question no. 391 (ord. part) asked by the parliament's Committee for Environment and Food on 15 Januar 2016 (http://www.ft.dk/samling/20151/almdel/mof/spm/391/svar/1299227/1598927/index.htm , in Danish)
AG-13(new): Agreement on Nature (the Nature Package)	Yes*	Agriculture, Forestry/LULUCF	CO2, CH4, N2O	Protection of biodiversity through increased involvement of farmers in land use planning, simplification of related legislation etc. (), Protection of biodiversity through increased involvement of farmers in land use planning, simplification of related legislation etc. ()	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2016	Government:Ministry of Environment and Food	IE (G1)	IE (G1)	

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.8 LULUCF (Land-Use, Land-Use Change and Forestry)

4.3.8.1 CO_2 – emissions and removals in LULUCF under the Climate Convention

The emission of GHGs from the LULUCF sector (Land Use, Land Use Change and Forestry) includes primarily the emission of CO_2 from land use and small amounts of N_2O from disturbance of soils not included in the agricultural sector.

The LULUCF sector is subdivided into six major categories:

- Forest
- Cropland
- Grassland
- Wetlands
- Settlements
- Other Land

Forests and forestry are important due to CO_2 sequestration and emissions as a consequence of trees growing, respiring and decomposing. Danish forests contain a considerable store of CO_2 absorbed from the atmosphere. When new forests are established, new CO_2 stores are created. Afforestation is therefore a useful climate policy instrument.

Cultivated organic soils are a large source for CO_2 emission. In 2015 cultivated organic soils has been estimated to be responsible for 6.7 % of the total Danish GHG emission. Cultivated agricultural mineral soils have also been estimated to be a minor source.

Forests

In the estimation of carbon pools and emissions from existing forests, afforestation and deforestation in 1990 to 2015, the information collected in relation to different forest census and inventories is combined with the satellite-based land use/land cover map for the base year 1990, 2005 and 2011. Hereby, consistent estimates of emissions from existing forests are obtained utilising as much information from the data sources as possible and providing best possible time series. To estimate the forest area satellite-based land use/land cover maps have been used for 1990, 2005 and 2011. From 2012 and onwards actual vector data are used.

Estimates of woody biomass carbon pools are obtained by applying species specific biomass functions developed for the most important tree species in Denmark (Skovsgaard et al. 2011; Skovsgaard and Nord-Larsen, 2012, Nord-Larsen and Nielsen 2015) to individual tree measurements in the National Forest Inventory plots. For tree species where no biomass function is available, stem volumen for conifers and the total above-ground volumen for deciduous trees are calculated using species specific volume or form factor functions. Subsequently, total stem or above ground biomass is calculated by multiplying the volumes with species specific basic densities for the wood. The estimated biomass is converted into total above-ground and below-ground biomass by multiplying with expansion factors calculated from expansion factor functions for beech and Norway spruce as representatives of deciduous and coniferous species (Skovsgaard et al. 2011; Skovsgaard and Nord-

Larsen, 2012). The quantity of carbon is calculated by multiplying by the conversion factor of 0.5 tonnes C/tonne dry matter.

Estimation of deadwood carbon pools follows the calculations stated above except that a conversion factor is applied according to the degree of decomposition of the wood.

Estimation of carbon pools in the forest floor (litter) is based on measurements of the depth of the litter layer on the National Forest Inventory plots. As peat lands are reported specifically, a maximum depth of 15 cm is used in the calculations. Forest-floor carbon for individual species is estimated by multiplication of the forest floor depth by the plot area, a species-specific density (Vesterdal & Raulund-Rasmussen, 1998) and the ground cover fraction of the individual species. Calculation of ground cover fraction is based on the proportion of basal area of the individual species and total forest-floor carbon is estimated by summation of forest-floor carbon of the different species.

For estimation of carbon pools in the mineral soil, average carbon content for different soil types (loamy, sandy and organic) were applied to the individual National Forest Inventory plots according to their soil types determined from Danish soil mapping. The average soil carbon contents used in this analysis were obtain in a forest soil inventory in which it was documented that forest mineral soil is not an overlooked source of CO_2 emissions. In a study, analysis of time series data did not reveal any changes in forest mineral-soil carbon pools observed in 1990 and 2007-2009.

A more detailed record of the calculations of carbon pools are provided by Nord-Larsen and Johannsen (2016)[18]. The forest area and total amounts of carbon stored in different pools of forests established before and after 1990 and forests removed after 1990 are provided in Table 4.22.

The changes in the different carbon pools are reflected in the CO_2 emissions from the forests. However, as land-use changes in forestry are also reflected in the carbon pools of other types of land use (e.g. cropland, grassland or wetland) the carbon pools provided in Table 4.22 cannot be translated directly into CO_2 emissions for forestry. Reported annual CO_2 emissions from forestry in 1990 to 2015 are provided in Table 4.23.

Compared with other sectors, forestry has very low energy consumption. Green accounting and environmental management are being developed in the sector, partly with a view to determining whether the use of fossil fuels can be reduced.

The National Forest Programme includes evaluation of the possibilities offered by the Kyoto Protocol for economically viable CO_2 sequestration in forests. Such measures should be implemented without undermining the Protocol's environmental integrity or counteracting established measures in support of sustainable forest management. The forests are managed with a view to multiple-use and sustainability, and carbon sequestration is one of several objectives.

TABLE 4.22 AREA AND CARBON POOLS IN WOODY BIOMASS AND FOREST SOILS IN FORESTS ESTABLISHED BEFORE AND AFTER 1990 AND IN DEFORESTATION.

Source: University of Copenhagen - Department of Geosciences and Natural Resource Management, NFI estimates, March 2017

Area and Carbon Pools	1990	2000	2010	2011	2012	2013	2014	2015
Forests established before 1990								
Area (ha)								
Forest	544.541	543.208	538.589	537.900	537.541	537.204	536.677	533.504
Organic soil	26.559	26.494	26.269	26.235	26.218	26.201	26.176	26.021
Biomass (‘000 tonnes C)								
Above ground	25.293	27.096	28.772	29.845	30.578	31.270	31.892	32.279
Below ground	5.393	5.802	6.214	6.461	6.632	6.784	6.919	6.978
Dead wood	360	409	504	516	539	565	635	623
Soil (’000 tonnes C)								
Forest floor	6.074	6.041	6.572	6.839	7.095	6.930	7.137	6.520
Mineral soil	93.350	93.139	92.388	92.276	92.218	92.165	92.075	91.537
Forests established after 1990								
Area (ha)								
Forest	-	47.613	89.141	93.177	95.011	100.067	100.626	104.069
Organic soil	-	4.744	8.993	9.413	9.503	10.049	10.110	10.389
Biomass (’000 tonnes C)								
Above ground	-	88	789	832	827	852	925	1.080
Below ground	-	21	187	194	189	192	205	237
Dead wood	-	3	18	14	11	7	7	7
Soil (’000 tonnes C)								
Forest floor	-	228	380	379	380	384	397	399
Mineral soil	-	8.895	16.724	17.489	17.773	18.745	18.852	19.456
Deforestation								
Area (ha)								
Forest	-	121	662	662	323	141	474	2.599
Organic soil	-	6	32	32	16	7	23	127
Biomass (’000 tonnes C)								
Above ground	-	-2	-21	-22	-7	-6	-21	-39
Below ground	-	-0	-4	-5	-2	-1	-4	-8
Dead wood	-	-0	-0	-0	-0	-0	-1	-3
Soil (’000 tonnes C)								
Forest floor	-	-0	-4	-4	-1	-1	-6	-28
Mineral soil	-	-19	-108	-108	-52	-23	-81	-441

TABLE 4.23CARBON DIOXIDE BALANCES OF FOREST MANAGEMENT (ARTICLE 3.4) AND LAND-USE CHANGE RELATED TO FOREST (ARTICLE 3.3).

Source: Denmark’s National Inventory Report 2017

CO_2 sequestration in Gg (negative = emissions)	1990	2000	2010	2011	2012	2013	2014	2015*
Forest Land	927	-834	-3654	-5844	-4142	-2492	-3990	306
Art. 3.3	32	-81	-137	27	144	54	-216	-361
Afforestation	0	-115	-231	-67	109	19	-332	-614
Deforestation	32	34	94	95	36	36	116	253
Art. 3.4 Forest Management	895	-753	-3517	-5871	-4286	-2546	-3774	668

* Temporary figures due to changes pending the final review.

The political measure to increase carbon sequestration is the objective from the National Forest Programme (2002): “Forest landscapes should cover 20-25% of Denmark after one tree generation (80-100 years)” – and the scope and potential for natural habitats and processes should be strengthened in this effort. This measure relates to Article 3.3 of the Kyoto Protocol. Various measures have been taken towards achieving this goal as shown in Table 4.25[17]. For instance, a government grant scheme has been established as an incentive for afforestation on private agricultural land. Also, the state itself is establishing new forests, and some private individuals are establishing forests on agricultural land without a government grant. Through rural planning and differentiated incentives, afforestation is particularly encouraged in certain priority areas in order to pursue multiple forest functions and values, implementing the water framework directive and including recreation and ground water protection.

Carbon sequestration in afforestation is stored in the total living biomass (incl. roots) of the trees. Forests raised on agricultural land accumulate far more biomass than the previous agricultural land-use. The forest biomass contains about 50% carbon, which is absorbed as CO_2 through photosynthesis. Probably, additional carbon is stored in the organic matter in the soil following afforestation of cropland due to a larger supply of dead organic matter and the absence of soil preparation. Denmark reported on sequestration in litter (forest floors) developing after conversion from agriculture to forestry while mineral soil C stocks are reported as unchanged based on field measurements. Previous studies did not indicate any consistent change in mineral soil C stocks (*Vesterdal et al., 2002, 2007*).

The effect of afforestation on other greenhouse gases, such as nitrous oxide and methane has recently been studied in Denmark (*Christiansen and Gundersen, 2011*). The acidification of nitrogen-rich former agricultural land may stimulate the formation of nitrous oxide, and blocking of drains after afforestation and the resulting water stagnation could increase methane emissions. The recent projects have shown that methane uptake in soils is in fact increased following afforestation of well-drained soils, although only in oak stands, while methane uptake was unchanged in Norway spruce (*Christiansen and Gundersen, 2011*). In more wet afforested areas, methane may be emitted when drainage pipes stop working (*Christiansen et al., 2012*). Nitrous oxide emissions increased with time since afforestation in both oak and spruce stands (*Christiansen and Gundersen, 2011*). Increased methane and nitrous oxide emissions could to some degree counteract the positive effect of afforestation on CO_2 sequestration. However, since information is still scarce on changes in the methane and nitrous oxide emissions, analyses of the consequences of afforestation are only carried out for CO_2.

The continued growth of new forests will provide for carbon sequestration on a long-term basis. If the objective mentioned above of increasing the Danish forested area is achieved, the new forests will sequester about 250 million tonnes of CO_2 over the next approximately 120 years. Owing to the legal protection of forest land use, the sequestration in subsidised afforested land is expected to be permanent. If the objective of increasing the forest area is to be achieved, however, an enhanced rate of planting will be needed. Afforestation offers many other benefits in addition to CO_2 sequestration. Conversion of farmlands into forest reduces the loss of nitrogen to the aquatic environment. Besides playing a major role in protecting the aquatic environment from nitrogen afforestation provides valuable groundwater protection and protection of habitats for fauna and flora. Forest is also a highly valued type of nature in terms of cultural values and landscape amenity and has great value for outdoor recreation. In addition to carbon sequestration, afforestation thus contributes to a wide range of values.

The Danish National Forest Programme is aiming at sustainable forest management equally based on economic, ecological, environmental and social concerns. The Programme aims at long-term conversion towards a forest management regime, which increasingly supports and utilises the natural processes of the forest. For state-owned forests (about 18% of the forested area) it has been decided to introduce close-to-nature forest management. The Forestry Act of 2004 also provides for better opportunities for private forest owners to move in this direction. However, at the moment it is uncertain how far and how quickly this will happen. The Danish National Forest Programme is under revision. It is not certain what the impacts of a change in management towards more close-to-nature forestry will mean for storage of carbon in the existing forested areas in the future. Some close-to-nature forest management principles such as longer rotation and more permanent forest cover may result in more CO_2 stored in forests, while grazing and more open areas have the opposite effect. Any change in annual average increment will have an impact too, but it is not clear in which direction this may go. On the one hand a move towards a wider use of domestic tree species might impose a decline in annual increment and thereby carbon storage in forests and timber products, as compared to faster growing exotic species. On the other hand a movement towards more stable and diverse forest structures, which are less sensitive to wind falls and other natural disturbances than monocultures of exotic species, might impose an increase in total carbon storage due to reduced loss caused by natural disturbances.

Another initiative related to forestry concerns Denmark's election of Article 3.4 under the Kyoto Protocol, i.e. the sequestration of C in forests existing by 1 January 1990. Net C sequestration in forest remaining forest is the result of relatively low harvest intensity compared to increment, whereas net emissions occur when harvesting rates exceed annual increment. Net C sequestration in forest remaining forest could partly be a result of an uneven age class distribution with a relatively large proportion of young stands, where biomass is building up. Conversely, net emissions from forest remaining forest may be a result of a relatively large proportion of older stands where harvesting exceeds increment. Actual price relations as a result of changing markets influence these relations, as do natural calamities such as wind fall or fungi (such as ash dieback). Emissions from forest remaining forest are given in Table 4.22 ("Forests established before 1990"). The new National Forest Inventory has enabled reporting on dead wood and litter, while for soil C, Denmark applies the non-source principle, i.e. Denmark uses evidence from repeated sampling of forest plots sampled in 1990 and 2008-2009 and will continue this documentation in 2014-2020 that forest soils are not net sources of CO_2.

*4.3.8.2 **CO_2 – emissions, removals and credits from Activities under Articles 3.3 and 3.4 of the Kyoto Protocol***

In 2007, a research and monitoring programme for the monitoring and reporting activities under Articles 3.3 and 3.4 was decided with a total budget of DKK 72 million. The results from this programme have been included in the annual reporting of greenhouse gas inventories under the UNFCCC and the Kyoto Protocol since April 2010 and the final results are approved under the Kyoto Protocol with the publication of the inventory review report on 4 February 2015.

A new research and monitoring programme has been launched to cover the 2nd commitment period 2013-2020.

The results from these programmes are further described in the following sections.

4.3.8.2.1 Article 3.3

In accordance with Article 3.3 of the Kyoto Protocol, emissions and removals from afforestation, reforestation and deforestation (ARD) activities have been included in the accounting of Removal Units (RMUs) in the 1st commitment period 2008-2012 under the Protocol. The total accounted quantity in the 1st commitment from ARD was a net loss of 255.9 Gg. Mainly due to a low growth rate in the afforested areas and a high deforestation rate (Submission to UNFCCC in April 2014 and UNFCCC inventory review report of 4 February 2015).

In total for the first 3 years of the 2nd commitment period afforestation, reforestation, and deforestation (ARD) activities has been estimated to a net sink of approximately 506 Gg CO_2-equivalent or in average 169 Gg CO_2-equivalent per year.

No reforestation was recorded in in the 1st commitment period or the first 3 years of the 2nd commitment period.

4.3.8.2.2 Article 3.4

In accordance with Article 3.4 of the Kyoto Protocol, emissions and removals from forest management (FM), cropland management (CM) and grazing land management (GM) activities have been elected to be included in the accounting of RMUs in the 1st and 2nd commitment period under the Protocol.

Forest management

According to the final estimates for the 1st commitment period (2008-2012) (*Nielsen et al., 2014* and the *Inventory Review Report* published on 4 February 2015), average CO_2 removals from Forest Management amounted to 4050 Gg. The included carbon pools were above-ground and below-ground biomass, dead wood and soil. This estimate was much higher than the specified maximum of credits as removal units for Denmark at 183 Gg CO_2 (50Gg C) annually in 2008-2012.

In 2015 the preliminary removal for forest management for the years 2013 to 2015 has been estimated to 5653 Gg CO_2-eq or equivalent to 1884 Gg CO_2-eq in average per year (Nielsen *et al., 2017, in prep*). This combined with a Forest Management Reference Level (FMRL) of 407 Gg as inscribed in the appendix of the annex to decision 2/CMP.7 and a preliminary technical correction of -82.6 Gg (Nielsen *et al., 2017, in prep*) gives a preliminary net accounting of 6632 Gg CO_2-eq or equivalent to 2211 Gg CO_2-eq in average per year from Forest Management in 2013-2015.

Emissions from forest management may originate from an increased harvesting caused by an uneven age distribution such as observed for beech in Denmark. However, the observed emissions origins from a lower sequestration in living biomass than usually observed and an unexplained loss of carbon in the forest litter pool.

Harvested wood products (HWP)

Carbon emissions from harvested wood products (HWP) have been reported since 2013. Denmark has chosen to report under Approach B, the production approach, which refers to equations 12.1, 12.3 and 12.A.6 of volume 4 of the 2006 IPCC Guidelines and the 2013 Supplementary GPG.

According to a questionnaire on the production of the Danish wood industry the production of sawnwood in 2015 was about 428.000 m^3, while the production of wood-based panels was about 387.000 m^3. The questionnaire covered an estimated

95 % of the revenue generated in the sawnwood sector and 100 % of the sector revenue for wood-based panels (there was only 2 relevant companies).

As of 2015 the HWP pool originating from domestic harvest and domestic consumption consisted of about 5 million tonnes carbon (67 % from sawn wood and 33 % from wood-based panels – the paper pool was insignificant). This is equivalent to 13 % of the carbon stock in live forest biomass. If imported wood were also included, the pool increases to about 29 million tonnes carbon equivalent to 75 % of the carbon stock in live forest biomass. The total inflow of carbon to the HWP pool in 2015 is reported to about 158.000 tonnes carbon - 69.000 tonnes from sawn wood and 89.000 tonnes from wood-based panels as shown in Table 4.24. The outflow from the pool is reported to about 112.000 tonnes carbon in 2014 - 66.000 tonnes from sawn wood and 47.000 tonnes carbon from wood-based panels. Thus there has been a net carbon sequestration in HWP of about 46.000 tonnes carbon in 2015. The projected net sequestration in 2015 is about 19.000 tonnes carbon.

TABLE 4.24. HWP IN USE FROM DOMESTIC HARVEST (CRF TABLE 4.GS1).

HWP produced and consumed domestically (ΔC HWPdom IU DH)	HWP in use from domestic harvest				Net emissions/ removals from HWP in use
	Gains	Losses	Half-life	Annual Change in stock (ΔC HWP IU DH)	
	(t C)		(yr)	(kt C)	(kt CO2)
Total	**158210.79**	**-112231.04**		**45.98**	**-168.48**
1. Solid wood	158210.79	-112167.51		46.04	-168.72
Sawn wood	68797.41	-65503.12	35.00	3.29	-12.07
Wood panels	89413.38	-46664.40	25.00	42.75	-156.64
2. Paper and paperboard	NO	-63.53	2.00	-0.06	0.23

Cropland management and Grazing land management:

In 2006, the government at that time decided to include removals of CO_2 by soils (Article 3.4 of the Kyoto Protocol) in the calculation of Denmark's climate accounts under the Kyoto Protocol

From 1990 to the 1st commitment period 2008-2012 Cropland management and Grazing land management has shown a net reduction in greenhouse gas emissions of 7697 Gg CO_2-equivalents or in average 1539 Gg CO_2-equivalents per year ..

From 1990 to the first three years of the 2nd commitment period, i.e. 2013, 2014 and 2015, Cropland management and Grazing land management has shown a net reduction in emissions of 4405 Gg CO_2-eq. or in average of 1468 Gg CO_2-equivalents per year.

Contributions to the Kyoto Protocol under Article 3.4 concern changes to vegetation and soil carbon stocks. Under the Kyoto Protocol, the flows of carbon to and from biomass and soils are stated according to a net-net principle by which the change in net emissions is calculated as the rate of change for the carbon stock in the 1st and 2nd commitment period less the rate of change for the carbon stock in the reference year (1990). As elected land cannot leave an elected activity, emissions from areas, which have been converted from Cropland and Grassland to Wetlands and Settlements in the commitment periods, are included in the accounting. For agriculture, the following potential sources of CO_2 emissions and CO_2 sequestration have been included:

1. Net change in the content of carbon in mineral soils in connection with changed land use and cultivation.

2. Net change in the soil's carbon stock in connection with drainage and cultivation of organic soils or re-establishment of wetlands.

3. Change in the carbon content of wood biomass in wind breaks and fruit farms.

The agricultural mineral soils has shown to be a steady increasing sink. This is primarily due to increased yields, better management, ban on straw burning, statutory requirements for catch crops, etc.

One of the measures with an effect on return of carbon to the soil has been the ban on burning of straw residues on fields as shown in Table 4.25.

The ban has resulted in greater return of carbon to the soil, and therefore increased carbon storage in the soil, as well as increased use of straw as a fuel. Both uses will result in a net reduction in CO_2 emissions. Not burning straw prevents the methane and nitrous oxide emissions associated with the burning. On the other hand, there are some emissions of nitrous oxide in connection with the return of nitrogen to the soil when the straw is mulched.

The measure works by regulating behaviour, and the ban was introduced from 1990. The measure was implemented in the form of a statutory order under the Environmental Protection Act. Ban on field burning is a part of cross compliance under EUs Common Agricultural Policy.

Demands on growing catch crops (primarily grass) in the autumn to reduce the nitrate leaching do also sequester CO_2. The area today is >220.000 hectares or 8 % of the agricultural area. Based on plans for future agricultural regulations the area is expected to increase towards 2021.

The agricultural yields are projected to increase in the future due to a shift in the fertilizer regulation from 2015. Higher yields will result in a higher amount of crop residues returned to soil and secondary increase the soil carbon stock.

Another measure which will increase sequestration in woody biomass is the planting of windbreaks also mentioned in Table 4.25. The objective of planting windbreaks has been primarily to reduce wind erosion and ensure greater biodiversity. Planting of windbreaks has been supported under conditions described in the Statutory Order on Subsidies for Planting Windbreaks and Biotope-improving Measures (Statutory Order no. 1101 of 12/12/2002). Support has been granted under the EU Rural Districts Programme. For the period 2017-2019 windbreaks will be established under the political agreement of May 2016 called “Naturpakken” and will focus primarily on ensuring greater biodiversity. Since the end of the 1960s about 1,000 km of tree-lined windbreaks have been planted with government subsidies. It is also estimated that about 30% more has been planted without subsidies. Estimates indicate that planting of windbreaks leads to CO_2 sequestration in woody biomass of about 130,000 tonnes CO_2/year[19]

Total from activities under Articles 3.3 and 3.4

The total amount of net RMU credits from activities under Articles 3.3 and 3.4 is estimated at 8.6 million RMUs (or tonnes of CO_2-equivalents) for the whole period 2008-2012 or as the average per year 1.7 million RMUs.

The total preliminary amounts of net RMU credits under Articles 3.3 and 3.4 has been estimated to 11.5 million RMUs (or tonnes CO_2-equivalents) in the first three years of 2nd commitment period or in average 3.8 million RMUs per year.

TABLE 4.25 MEASURES WITHIN LAND-USE, LAND-USE CHANGE AND FORESTRY (LULUCF) TO LIMIT EMISSIONS BY SOURCES AND ENHANCE REMOVALS BY SINKS

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
LU-1: Ban on burning straw on fields	Yes*	Forestry/LULUCF	CO2	Conservation of carbon in agricultural soils and reduction of air pollution. ()	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1989	Government:State, Local:Municipalities	IE (G7)	IE (G7)	
LU-2: Planting of windbreaks	Yes*	Forestry/LULUCF	CO2	Enhancing carbon sequestration through planting of windbreaks ()	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1960	Government:Ministry of Environment and Food	IE (G7)	IE (G7)	
LU-3: Subsidies scheme for private afforestation on agricultural land (increase the forest area in Denmark)	Yes*	Forestry/LULUCF	CO2	Afforestation and reforestation (LULUCF), Strengthening protection against natural disturbances (LULUCF)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1991	Government:Danish Environmental Protection Agency	IE (G7)	IE (G7)	
LU-4: Public afforestation (state and municipalities)	Yes*	Forestry/LULUCF	CO2	Afforestation and reforestation (LULUCF), Strengthening protection against natural disturbances (LULUCF)	Regulatory, Voluntary Agreement	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1989	Government:Danish Environmental Protection Agency, Local:Municipalities	IE (G7)	IE (G7)	
LU-5: Subsidy for conversion of arable land on organic soils to nature	Yes*	Forestry/LULUCF, Agriculture	CO2, N2O	Reduction of fertilizer/manure use on cropland (Agriculture), Prevention of drainage or rewetting of wetlands (LULUCF)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2015	Government:Ministry of Environment and Food	IE (G7)	IE (G7)	
G7(new): LULUCF activities	No	Combined (LU-1, -2, -3, -4 and -5)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	1740	1740	Estimates by DCE, 2017 (http://dce2.au.dk/pub/SR244.pdf).

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.3.9 Waste

The direct contribution of the waste sector to greenhouse gas emissions consists primarily of methane from the decomposition of organic waste that takes place at landfill sites. Greenhouse gas emissions from wastewater treatment include both methane (81%) and nitrous oxide (19%). Out of the total greenhouse gas emissions from the waste sector of 1.2 million tonnes CO_2 equivalents in 2015 – corresponding to 2.4% of total Danish greenhouse gas emissions – the proportion from landfills was 66%, from compost production 19%, from wastewater treatment 13% and 2% from other minor sources such as accidental fires.

Please note that all incineration of waste in Denmark is associated with energy utilisation, which is why the emission of CO_2 from the incineration of plastic waste is included under the energy sector.

4.3.9.1 ***CH_4 (methane)***

In previous years, efforts within the waste sector have been based on the Action Plan for Waste and Recycling 1993-97, which included targets on waste treatment up to the year 2000. The plan did not relate directly to the waste sector's contribution to methane emissions (CH_4), but included a number of initiatives that are of relevance to waste products containing industrial gases (HFCs and SF_6), besides an objective concerning stopping landfilling combustible waste.

Nor did the subsequent waste plan, Waste 21, which covers the period 1998-2004, relate directly to the waste sector's possibilities for contributing to solution of the problem of greenhouse gas emissions. The plan aimed at stabilising the total quantities of waste in 2004, and increasing recycling and reducing the environmental burden from the environmentally harmful substances in waste, including the industrial gases. With respect to waste incineration, the objective was to adjust incineration capacity to what was absolutely necessary to ensure best possible energy utilisation, maximum CO_2 displacement and regional self-sufficiency. The plan thus contributed indirectly to reduction of greenhouse gas emissions.

The objective in Waste 21 was for 64% of all waste to be recycled, 24% to be incinerated and not more than 12% to be landfilled.

That objective was already reached in the year 2000, and according to the Danish Environmental Protection Agency's Waste Statistics 2000 (ISAG) total waste in that year amounted to about 12.8 million tonnes.

Waste Strategy 2005-08 was issued in September 2003. The Waste Strategy aimed at decoupling growth in waste amounts from economic growth. The Strategy also aimed at preventing the loss of resources in waste and environmental impacts from waste, as well as better quality waste treatment and an efficient waste sector. Finally, the strategy aimed at reducing waste amounts sent to landfill to 9% in 2008 and increasing recycling to 65% of all waste.

The most important initiatives regarding greenhouse gases in the Strategy were improvement of landfills and increased collection of plastic packaging for recycling.

The first part of the Waste Strategy 2009-12 was issued in March 2009 and the second part was issued in June 2010. The recycling target for all waste was still 65%, and the target for overall waste amount sent to landfills was reduced to 6%.

The current waste strategy (*Denmark without Waste I + II*) reflects a general change of focus in Denmark to considering waste as a resource. The Danish waste strategy includes 1) a Resource Strategy for Waste Management which focuses on increasing recycling and 2) a Waste Prevention.

The Resource Strategy for Waste Management 2013-18 (*Denmark without Waste I*) includes 50% recycling of seven fractions (organic, paper, cardboard, glass, plastic, wood and metal) of household waste in 2022. The strategy focuses on organic waste from households and the service sector, recovery of shredder waste, construction and demolition waste and phosphorous in sewage sludge.

It is estimated that the initiatives in the strategy will lead to a decrease in the amount of incinerated waste (820.000 tonne less in 2022).

The Waste Prevention Strategy (*Denmark Without Waste II*) 2015-20 includes a number of initiatives with a special focus on food waste, textiles, electronic equipment, packaging and construction.

Both the Resource Strategy for Waste Management and the Waste Prevention Strategy have the purpose of keeping materials and products in circulation thus reducing primary production of materials and products, which is often energy demanding. The two strategies thus lead to indirect greenhouse gas savings, which are not directly quantifiable.

The latest figures for waste in Denmark are in the Danish EPA Waste Statistics 2015. Total waste (excluding soil) in 2015 was 11.3 million tonnes of which 69% was recycled, 27% incinerated, and 4% landfilled.

The waste sector's contribution to the direct reduction of greenhouse gas emissions consists mainly in:

- banning the landfilling of organic waste,
- utilising gas from closed as well as existing landfills,
- optimising the oxidation of gas in landfill covers (biocovers),
- recovery of shredder waste from landfills.

On the top of this there are measures that indirectly reduce greenhouse gas emissions:

- increasing recycling of plastic-, paper-, cardboard-metal-, WEEE-, wood-, and glass-waste, that will substitute primary production of materials
- using waste (except for plastics) as an energy source in dedicated incineration plants
- digestion of organic waste to produce biogas.

An overview of the detailed measures implemented in the pursuance of these objectives is given in Table 4.26[20]. The emission of methane from Danish landfills is calculated to have been 71,000 tonnes gross in 1990, decreasing to approximately 33,800 tonnes in 2013, corresponding to a 52 per cent reduction.

As a consequence of the municipal obligation to assign combustible waste to incineration, from 1 January 1997, methane emissions from the Danish landfills will continue to decrease in the years ahead.

According to the Danish Energy Authority's inventory Biogas, Production, Forecast and Target Figures, there were 25 gas plants at Danish landfills in 2002. These installations produced 10,000 tonnes of methane annually, compared to approx. 1,700 tonnes in 1993. In 2004, methane recovery from landfills amounted to 7,700 tonnes methane[21]. The same study shows that, through optimising existing gas plants, a further 1,800 tonnes methane per year could be recovered over the next five years. Furthermore, the establishment of new gas-collection equipment at five landfills could contribute with additional 1,300 tonnes methane per year over the next five years.

However, optimisation of existing plant and establishment of new gas plants will probably require subsidies. The previous subsidy scheme to promote gas collection at landfills was discontinued at the end of 2001.

Only a few landfill gas plants are expected to be established in the future. The maximum quantity of methane recovered peaked in 1998 at about 13,200 tonnes. The quantity of methane recovered will continue to fall gradually over many years.

The total quantity of waste incinerated rose from 2,216,000 tonnes in 1994 to 3,068,000 tonnes in 2015, i.e. an approximately 57% increase. This is a slight decrease compared to 2006 where 3,489,000 tonne of waste was incinerated. The energy produced from the incineration plants is included as part of the renewable energy production in the Danish energy statistics. The international greenhouse gas inventories include greenhouse gases from incineration of the content of oil-based products, such as plastics in waste.

In accordance with the targets in the waste strategies, waste incineration plants are designed so as to optimise energy utilisation.

Besides the direct effect of waste management on greenhouse gas emissions, the emissions are also affected indirectly through recycling of paper, cardboard, plastic, metals, etc. which means less energy consumption and thus less CO_2 emissions during production of raw materials and new products.

The implementation of national waste plans and fulfilment of targets has necessitated the implementation of a wide range of measures.

In 1996 the Statutory Order on Waste was amended to introduce a municipal obligation to assign combustible waste to incineration (corresponding to a stop for disposal of combustible waste at landfills). As a result of this, large quantities of combustible waste that used to be disposed of at landfills are now either recycled or used as fuel in Danish incineration plants.

Besides the traditional regulation via legislation, statutory orders, and circulars, the waste sector is regulated by means of a range of policies and measures, including taxes and charges, grant schemes and agreements.

A tax on landfilling and incineration of waste was introduced in Denmark in 1987. Since 1993 the tax has been differentiated to reflect the political priorities of the different forms of treatment. It thus costs most to dispose of waste, less to incinerate the waste and nothing in tax to recycle waste. The waste tax has been increased several times and today (March 2015) the waste tax is DKK 475 per tonne waste disposed of at landfills and the energy tax associated with incineration of waste is 60,9 DKK/GJ (equalling an approximated average of DKK 330 per tonne waste for incineration). The size of the taxes thus provides an incentive to recycle as much of the waste produced as possible and to use non-recyclable, combustible waste as fuel in energy production instead of disposal of the waste at landfills.

Weight-and-volume-based taxes (e.g. on various packaging, carrier bags and PVC film) encourage a reduction in packaging consumption and thus the quantities of waste. The weight-based tax is based on an index that reflects the environmental burden of the materials used.

Under the Danish EPA's "Programme for Cleaner Products etc.", grants were made for projects that reduced the environmental burden in connection with development, production, sale and use of products or in connection with the management of the waste generated during the product's entire lifecycle. Furthermore, support could be granted to waste projects aiming at reducing the problems in connection with disposal of waste. A total of approximately DKK 100 million for the part of the programme related to waste was allocated for the 5-year period 1999 to 2003.

In 2005 the Programme for Cleaner Products etc. was replaced by the Danish government's "Enterprise Scheme" which refunds CO_2 taxes to business. The waste part of this programme was aimed exclusively at enterprises. A total of DKK 33 million for the five-year period 2004 to 2008 was earmarked for the waste part of the scheme. The subsidies were to be used to reduce the environmental impact of waste.

In 2005, the Danish EPA also supported initiation of a development project aiming at documenting the oxidation of methane in landfill biocovers. By applying covers mainly consisting of compost, optimal oxidation in covers can be ensured and methane emissions from landfills can be reduced. If the reduction can be documented it can be credited to the CO_2 accounts. This bio-cover project was carried out by the Technical University of Denmark with funding from the EU LIFE Programme. The bio-cover project has established a viable methodology for documentation of the reduction of greenhouse gas emissions gained by installation of a bio-cover system on a landfill. The methodology consists of a logical order of tasks using well documented measuring technologies. The demonstration project also proved that several obstacles may occur in relation to the biocovers on landfills which can prevent an efficient greenhouse gas reduction, and the project has obtained an understanding of which precautions should be taken.

The most important obstacles are:
a) Ability to control point gas releases,
b) Ability to distribute the landfill gas to active parts of the bio-cover system, and
c) Ability to obtain a spatially even gas distribution to active parts of the bio-cover.

Due to the obstacles the goal of reaching a 90% reduction of the methane emission was not reached; the obtained reduction was in the 20-30% range.

To address the obstacles and to improve the method, another biocover-project was initiated in 2007 as part of the Enterprise Scheme. The project was performed on another landfill, and was taking the identified difficulties into account. A reduction of the methane emission of 79-93 % was reported in the project.

Based on the promising results of the latest large scale biocover-project combined with a low shadow price, approximately 180 mio. DKK has been allocated to a Subsidy programme for biocovers at landfill sites. The subsidy programme is expected to run from 2016 – 2019, and the estimated reduction in methane-emission in the year 2020 is 300,000 t CO2-equivalents.

In 2007 subsidies from the enterprise scheme were given for establishing methane recovery and test pumping at 11 landfill sites. The results were reported in 2011 and showed a reduction of the emission of methane over a five year period equalling 84,435 tonnes of CO2 equivalents.

The goal in the EU Packaging Directive of increasing the collection of plastic packaging waste for recycling to 22.5% was met in 2008 through an amendment to the Statutory Order on Waste requiring municipalities to improve the possibilities of people and enterprises to separate and deliver plastic packaging waste for recycling. This meant an increase in recycling of about 12,000 tonnes in 2012 compared to 2008.

Furthermore, producer responsibility obligations have been introduced concerning waste electrical and electronic equipment (WEEE) and batteries due to new EU Directives resulting in higher collection and recycling rates of these used products. The aim is to increase recycling of metals significantly, resulting in energy savings compared to extraction and refining of virgin materials.

On the basis of the EU Landfill Directive, demands on the establishment and operation of landfills in Denmark have been tightened with Statutory Orders No. 650 of 29 June 2001, No. 252 of 31 March 2009, No. 719 of 24 June 2011 and No. 1049 of 28th of August 2013 on landfills. According to the Statutory Orders on landfills, methane in landfills for mixed waste must be monitored. From landfills where significant amounts of biodegradable waste are disposed of, methane gas must be managed in an environmentally-sound way.

An amendment to the Statutory Order on Waste in 2000 means that municipalities must now assign non-recyclable waste PVC and impregnated wood to landfill. The objective is to avoid adding PVC and impregnated wood to incineration with the consequential pollution of flue gas and slag. Work is being carried out to develop new treatment methods in order to utilise the resources in waste. When these methods have been developed and new plants established, it is expected that the Statutory Order on Waste will be amended so that PVC and impregnated wood is assigned to these plants and landfilling is avoided. However, due to higher costs related to the establishment of temporary storage capacity at landfills in comparison with the cost of transportation and incineration at incineration plants abroad with excess capacity, in particular in Germany, the most common solution for impregnated wood waste has been export for incineration.

It is not possible to make a quantitative estimate of the effects of the various measures for the waste area. The objectives in the national waste plans are related to waste amounts and their treatment. The developments are monitored through the annual waste statistics. However, changes in the treatment of waste cannot immediately be converted into changes in emissions of greenhouse gases.

TABLE 4.26 MEASURES WITHIN THE WASTE SECTOR TO REDUCE EMISSIONS OF GREENHOUSE GASES.

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
WA-1: A ban of landfill of combustible waste.	Yes*	Waste management/waste	CH4	Reduced landfilling (Waste), Waste incineration with energy use (Waste), Enhanced recycling (Waste)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1997	Local:Municipalities	333	333	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
WA-2: The waste tax	Yes*	Waste management/waste	CH4	Reduced landfilling (Waste)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1987	Government:Ministry of Taxation	IE (G1)	IE (G1)	
WA-3: Weight-and-volume-based packaging taxes	Yes*	Waste management/waste	CO2, CH4	Demand management / reduction (Waste)	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2014	Government:Ministry of Taxation	IE (G1)	IE (G1)	
WA-4: Subsidy programme – Enterprise Scheme (special scheme for businesses)	Yes*	Waste management/waste	CH4	Demand management / reduction (Waste)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2004	Government:Ministry for the Environment	IE (G1)	IE (G1)	
WA-5: Increased recycling of waste plastic packaging	Yes*	Waste management/waste	CO2	Enhanced recycling (Waste)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1994	Government:Danish Environmental Protection Agency	IE (G1)	IE (G1)	
WA-6: Implementation of the EU landfill directive	Yes*	Waste management/waste	CH4	Improved landfill management (Waste)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1999	Government:Danish Environmental Protection Agency, Local:Municipalities	IE (G1)	IE (G1)	
WA-7(expired): Support for (construction of facilities for) gas recovery at landfill sites	Yes*	Waste management/waste	CO2, CH4	Enhanced CH4 collection and use (Waste)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1984	Government:Danish Energy Authority	205	205	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
WA-8(expired): Subsidy programme for cleaner products	Yes*	Waste management/waste	CH4	Demand management / reduction (Waste)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1999	Government:Ministry for the Environment	IE (G1)	IE (G1)	
WA-9: Subsidy programme for biocovers on landfills	Yes*	Waste management/waste	CH4	Improved landfill management (Waste)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2017	Government:Danish Environmetal Protection Agency	300	179	Estimates by the Danish Energy Agency, March 2017 - based on "Virkemiddelkatalog, Tværministeriel arbejdsgruppe, August 2013, Klima-, Energi- og Bygningsministeriet" (https://ens.dk/sites/ens.dk/files/Analyser/virkemiddelkatalog_-_potentialer_og_omkostninger_for_klimatiltag.pdf)
G1(changed): Group of all policies and measures except in the LULUCF sector	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7, -8, -9; EN-1, -2, -3, -4, -5, -6; BU-1, -2, -6, -7, -8, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12; HO-1, -2, -3, -4, -5, -6; IP-1; AG-1, -2, -4a-f, -6, -9, -11, -12, -13; WA-1, -2, -3, -4, -5,- 6, -7, -8, -9)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	43135	46585	Calculated as the sum of the effects estimated for G3, G4, TD-9, TR-12, G6, AG-1, AG-6, AG-12, WA-1, WA-7 and WA9.

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also shown in the "without measures" (WOM) scenario included in Chapter 5.

4.4 POLICIES AND MEASURES IN ACCORDANCE WITH ARTICLE 2, OF THE KYOTO PROTOCOL

4.4.1 Denmark's climate efforts – a step on the way to sustainable development

In 2015, United Nation countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. The Danish government is in the process of formulating an action plan for Denmark's national and international up-follow-up on the UN 2030 agenda and the global Sustainable Development Goals.

4.4.2 Efforts for international air transport and shipping

Denmark recognises that the international aviation and maritime transport sectors are large and rapidly growing sources of greenhouse gas emissions and have to be dealt with at international level. Given the global nature of the two sectors, Denmark believes that the international organisations for civil aviation and maritime transport – the ICAO and the IMO – should decide, develop and implement appropriate global measures to control greenhouse gas emissions from international aviation and maritime transport at levels keeping the EU's 2-degrees-Celsius objective within reach.

Denmark welcomes that ICAO in 2016 decided to implement the Carbon Offsetting and Reduction Scheme for International Aviation, CORSIA. CORSIA is a market based measure, and the aim of CORSIA is to achieve carbon neutral growth from 2020. This means that growth in the CO_2 emissions from international flights beyond the 2020 level will have to be compensated by reducing the CO_2 emissions elsewhere, for instance by investing in CO_2 reducing projects in developing countries.

Denmark welcomes that the IMO in October 2016 adopted a roadmap for developing a Comprehensive IMO Strategy on Reduction of GHG Emissions from Ships, which sets out an initial strategy to be adopted in 2018. Furthermore, Denmark recalls that IMO has in recent years adopted principles for climate regulation, especially the introduction of rules that increase ships' energy efficiency and the adoption of a global data collection system that charts the ships' fuel consumption.

Denmark has contributed actively in the discussions of the development of the roadmap and the development of the draft initial IMO Strategy on reduction of GHG emissions from ships and has proposed the need for IMO to define the fair share of international shipping in the global effort to limit the increase of global average temperature. Denmark is, together with other countries, working for a global IMO strategy, which is in accordance with the temperature goal of the Paris agreement. This must be done through global, flag-neutral solutions that can help reduce global CO_2 emissions consistent with the IMO principles.

Denmark further contributes actively to the ongoing discussions on the possibility to introduce a phase 4 after phase 3 in the agreed Energy Efficiency Design Index (EEDI) requirement together with the possibility to shorten phase 2 in order to move phase 3 forward to enter into force in 2022.

4.4.3 Efforts to limit adverse effects in other countries

In connection with Denmark's contribution to international climate efforts, in accordance with the Kyoto Protocol Denmark will endeavour to implement policies and measures under Article 3 of the Protocol in such a way that adverse effects in other countries are minimised. However, Denmark does not consider that its contributions to international climate efforts have adverse effects in other countries as, on the contrary, the reduction of emissions of greenhouse gases in Danish commitments under the Protocol will in fact contribute to limiting dangerous climate change in all countries.

If nothing is done to limit emissions of greenhouse gases, climate scenarios from the IPCC indicate that developing countries in particular will experience the greatest changes in climate.

In its international efforts, Denmark will therefore continue to take the greatest possible account of the special needs and concerns of developing countries and especially least developed countries. This also applies to adverse effects which can already be ascertained from changes in climate. The existing strong Danish focus on the special vulnerability of developing countries to climate change underlines this (see Chapter 7).

4.4.4 Strategies to mitigate climate change cf. Article 10(b) of the Kyoto Protocol

Denmark's Climate Strategy and measures to mitigate climate change are described in sections 4.1, 4.2 and 4.3.

4.5 POLICIES AND MEASURES NO LONGER IN PLACE

In Denmark's Sixth National Communication (NC6) including Denmark's First Biennial Report (BR1) from January 2014 the portfolio of climate relevant policies and measures reported included in total 52 initiatives. Of these, 2 initiatives already expired in 2001 (WA-7) and 2003 (WA-8) respectively. However, they were included in the reporting as the investment subsidy for landfill gas recovery (WA-7) and the subsidies for development of cleaner products and waste reduction (WA-8) could continue to have an effect on Denmark's total greenhouse gas emissions. This illustrates that policies and measures no longer in place could still have an effect on greenhouse gas emissions. Of the 52 initiatives, 5 were reported as new since NC5 from January 2010 (TD-9, BU-8, TR-8, HO-3 and AG-9). By mistake one initiative was in fact a group of some of the single initiatives reported (TD-1a).

Between Denmark's NC6/BR1 and Denmark's BR2 from January 2016 there were the following changes to the portfolio of climate relevant policies and measures: additional 2 initiatives were reported as expired (BU-1 and BU-7), 5 initiatives were reported as revised (TR-3, TR-4, TR-5, TR-6 and TR-7) and 11 new initiatives were reported (BU-9, BU-10, TR-9, TR-10, TR-11, TR-12, HO-4, HO-5, LU-5, WA-9 and WA-10). BR2 also included 4 groups of initiatives: G1(all initiatives), G2(energy taxes), G3(all renewable energy initiatives since 1990) and G4 (all energy efficiency initiatives since 1990).

From BR2 to this report (NC7/BR3) the major change in the portfolio of climate relevant policies and measures is that the Ministry of Transport, Building, and Housing has reassessed the transport relevant initiatives included in the climate reporting and now left out 7 initiatives previously included (TR-1b, TR-3, TR-4, TR-5, TR-6, TR-9 and TR-11). State funding for TR-1b, TR-2, TR-4, TR-5 and TR-9 has been discontinued. The scheme previously reported under TR-3 is currently being redesigned which makes uncertain the side effects on reduced CO_2-emissions. TR-6 has been merged with TR-10. The main purpose of TR-11 is to increase urban mobility . The CO_2-reduction from TR-10 is uncertain and only a side effect which will not contribute significantly to reducing Denmark's greenhouse gas emissions. Two initiatives have expired since BR2 (BU-7 and BU-8) and two initiatives – in principle still in place, but with no resources allocated (EN-5 and WA-10) - have been left out. Since BR2, 4 new initiatives (HO-6, AG-11, AG-12 and AG-13) and one revived initiative (BU-1) have been added to Denmark's portfolio of climate relevant policies and measures included in this report (NC7/BR3).

4.6 Policies and measures in Greenland

High basic energy demands and the expected emergence of an industrial sector indicate that Greenland's energy consumption is unlikely to decrease over the coming years. Nevertheless, government policies aim at reducing energy consumption, where possible, and to improve efficiency in existing energy production and supply.

During the last decades it has been a consistent priority to expand the use of renewable energy and today approximately 61% of the national energy supply is based on hydropower. Concurrently, potentials for wind energy, solar energy and hydrogen-based energy production are being explored on a smaller scale with possibilities for future expansion.

Policies and measures targeting energy production and energy consumption have multiple purposes. In addition to emission reductions, the shift to renewable energy sources is associated with a decreasing dependence on imported fossil fuels and positive effects on the local and regional environment. Improving the efficiency of the current energy production and supply system is cost-reducing and at the same time contributes to reducing GHG emissions. Energy-saving policies, acts and measures are therefore often designed to address a wider range of priorities; of which the reduction of GHG emissions remains predominant.

4.6.1 Policies and acts

A number of energy policies and acts which consider challenges, benefits and initiatives associated with reducing emissions and improving energy efficiency have been introduced:

The Coalition Agreement 2016 - 2018

This agreement entered into force on the 27th November 2016 with a given set of objectives concerning energy and climate.

The Coalition will work to introduce electricity, water and heating prices that are based on solidarity and equality. In this way the Coalition will ensure more equal conditions for all families. There must be uniform prices for electricity, water and heating for all production facilities in the country, to ensure equal opportunities to promote business and industry, wherever they are located.

The Energy Supply Act

Energy supply legislation was first introduced in 1997, when Parliament passed the Energy Supply Act covering the supply of electricity, heating and fuel. In accordance with the Act, the supply of energy must be managed to promote energy saving and be economically sound. It must further improve efficiency of the production and supply system while introducing an environmentally cleaner production of energy.

Economic incentives for fuel-efficient behaviour

The Greenlandic Parliament has furthermore passed three acts that create economic incentives for fuel-efficient behaviour:

- Act on Environmental Taxes for Products used in Energy Production is Greenland's first environmental tax on fossil fuels. The Act came into force in January 2011 and constitutes a direct tax of DKK 0.10 per litre of the retail price on most fossil fuels, regardless of end-use, creating an incentive to both reduce fossil fuel consumption and to invest in new and cleaner technologies within the private and public sectors.

- An increase in motor vehicle taxes, primarily targeting heavy vehicles. The Act came into effect in 2013.

- A general tax exemption for vehicles fuelled by electricity (EVs) or hydrogen. The tax exemption came into effect in January 2014 and will remain in place until 1st January 2018.

4.6.2 Past and on-going measures

Hydropower for electricity and heating

The development of hydropower has been central to the national energy supply since the 1970s. Throughout the 1970s and 1980s, systematic studies of possible hydropower potentials were carried out. The 1986 Energy Policy Guidelines stated that hydropower should be a bearing element of the future energy supply system in Greenland.

The first hydropower facility was opened in 1993 and since then the use of hydropower has gradually expanded. With the introduction of the fifth hydropower plant in 2013, the total capacity of the hydropower plants in Greenland amounts to 91 MW, covering around 50% of total supply. In 2014 the five hydropower plants will produce enough energy to save more than 67 million litres of oil, cutting greenhouse gas emissions by more than 174.7 Gg annually, which equals approximately 23% of the total greenhouse gas emissions in 2011 in Greenland.

Residual heat from energy production at the hydropower plants is in some places used for district heating. Surplus electricity production is likewise used for district heating and constitutes an efficient way of making use of energy that would otherwise go to waste. In Nuuk, the capital, the heating supply depends almost entirely on this kind of district heating. A couple of times a year, when the demand peaks, there is no surplus electricity production and temporary use of oil boilers ensures a continuous and steady heating supply. The most recent hydropower plant in Ilulissat will have district heating facilities installed by the end of 2013, which are expected to meet the total energy demand of the town.

In this way, hydropower constitutes a significant resource in improving the efficiency of existing energy production and reducing emissions of greenhouse gases in Greenland. While no new hydropower plants are planned for the coming years, initiatives and efforts to improve efficiency of existing production continue.

Waste Incineration Facilities

Waste management in Greenland is challenged by the vast distances and hence depends on local waste management schemes. In six major cities, incineration plants are in use. Much of the residual heat from these facilities is used for district heating and, in combination with hydropower-based heating, contributes to an energy-efficient heating system. The incineration of waste replaces fuel for heating and reduces emissions of methane that would otherwise occur, if waste was deposited at landfill sites.

In smaller towns and settlements, 46 small-scale incineration facilities have been established. The primary objective with these facilities is to provide an alternative method of waste disposal compared with open landfills in small communities. A current project carried out by the government, is investigating the potentials for improved use of residual heat from waste incineration plants. The project will contribute to the formulation of a strategy for incineration solutions in Nuuk as well as in smaller towns and settlements.

The project has determined that the best solution from an environmental and socio-economic perspective is to move towards centralisation of the country's waste management.

The aim is that all waste incineration will take place in three larger towns – Nuuk, Qaqortoq and Sisimiut – by 2024. Residual heat from waste incineration can complement existing energy sources in an efficient manner in Qaqortoq and Sisimiut, while large-scale advantages in Nuuk make it worth concentrating here.

Sector Programme for Renovation with Environmental and Energy Effects in Greenland 2000-2003

The objective of the Sector Programme was to ensure that efforts in the renovation of buildings and supply plants would increasingly take into account environmental and energy-saving aspects.

Projects carried out under the Programme included renovation of combined electricity and heat production plants (CHP plants) and supply grids along with renovation of buildings. It also included a revision of the existing building regulations, the preparation of a new energy plan and initiatives for behaviour-regulating measures.

In 2003, an evaluation of the Sector Programme was carried out, estimating a reduction in CO_2 emissions of more than 3,900 tonnes annually. Calculations were based on information from energy statistics provided by the Danish Energy Authority as well as estimates of reductions in the consumption of both electricity and oil.

The Transport Sector

The transport sector is considered a key sector, despite the fact that Greenland has no roads connecting towns and settlements. Even though the market for electric vehicles (EVs) is limited in Greenland, EVs have reached a technological stage of development, where they in some cases can become a realistic alternative to diesel vehicles.

The analysis, *Electric Vehicles as a Realistic Alternative in Nuuk*, from 2013 identifies barriers to the introduction of EVs in Nuuk and presents a number of recommendations for improving conditions for EVs in Nuuk. Surplus capacity from hydropower energy production that is now used for heating purposes can be used even more efficiently for charging EVs.

The initiative to push forward the introduction of EVs in Nuuk is backed up by several actors represented in a working group on EVs hosted by CSR Greenland; an organisation established in 2010 which promotes the benefits of responsible business and sustainable development in Greenland. The working group on EVs includes representatives from the municipality and the government, local businesses and interested citizens.

Other Initiatives

In 2013 the Ministry of Housing, Nature and Environment launched a national campaign to raise awareness of the effects of GHG emissions. The campaign was published in a number of local newspapers and in one national paper and encouraged energy-saving behaviour.

The Ministry of Labour, Trade, Industry and Energy supports the research in and development of new initiatives within the renewable energy sector.

The programme was designed to support research in hydrogen energy, but today has been expanded to include financial support for a wider range of projects within the field of energy and climate change adaptation. The projects supported under the programme are small-scale, but bring knowledge and practical experience to entrepreneurs and other interested actors in Greenland. As examples, solar panels have been established to supply a folk high school with energy, and in one settlement a micro-hydropower plant has been introduced to supplement energy production from a CHP plant. The programme has furthermore supported pilot projects on wind energy and geothermal energy. All projects provide good experience and useful lessons for entrepreneurs and they contribute to the generation of new knowledge about the opportunities for expanding the use of renewable sources in Greenland.

4.7 POLICIES AND MEASURES ON FAROE ISLANDS

4.7.1 Climate policy and policy-making process

The Climate Convention was ratified by the Realm, and therefore it also applies for the Faroe Islands. When ratifying the Kyoto Protocol the Danish government took a territorial reservation for the Faroe Islands.

In the spring 2008, the Faroese Government started a process formulating a Climate Strategy, and in the autumn 2008, a catalogue[22] of potential options to reduce emissions of greenhouse gases was published.

In December 2009, the Faroese Parliament adopted the Faroese Climate Policy. All the political parties in the Parliament adopted the policy.

A description of the national targets set in the strategy is in BR3, see Chapter VII.C.

In a move to follow international recommendations, the Faroese Government has decided that the Faroe Islands shall be part of the Paris Agreement.

The Faroe Islands are covered by the Kingdom of Denmark's ratification of the Paris Agreement. The Faroe Islands will, in accordance with the Paris Agreement, define and notify a separate Faroese emission reduction target. This will be communicated in addition to the NDC, which Denmark has already communicated as a part of the EUs NDC.

4.7.2 Policies and measures and their effect

The Faroe Islands will fulfil its obligations by accelerating the shift to renewable energy aiming to become completely self-sufficient in green energy. The Government aims for all power production from renewable sources by 2030.

In 2016 renewable energy was less than 6 % of total energy supply in the Faroe Islands. However, there is unexploited potential, especially in wind and solar power and in a longer perspective in tidal power.

Wind farms

SEV, the Public Power Company, owned by the Faroese municipalities, is responsible for production, transmission and distribution of nearly all power in the Faroe Islands. SEV announced its plans to reach 100% green energy power production by 2030, when the company officially opened the Húsahagi 11 MW wind farm on 9 October 2014. The wind farm at Húsahagi is, with its revolutionary battery system, which in terms of minutes and seconds balances the energy output to the grid, the first concrete step on the green course. The battery system enables higher yield from wind energy. A hundred percent green power production will reduce the emission of GHG with 90,000 tonnes CO_2 equivalents.

The Faroe Islands is surrounded by plentiful and unstable winds, with an average annual wind above 10 m/s on several locations. Energy production from wind is unstable and closely correlated to the changeable weather patterns in the Faroe Islands. The challenge is that wind alone cannot be the sole source of supply; rather the wind needs to be coupled with more stable production sources, such as hydropower.

Wind farms are easy and quick to build, as well as being an inexpensive form of production, and more energy from wind is certainly a part of the plan. This will most likely happen in conjunction with energy storage that can store excess wind energy, and then release the stored energy onto the grid, when wind production is low.

The first 0.2 MW wind turbine was erected in 1993 and was regarded as a test engine. In 2003, the private company Røkt installed 3 x 0.66 MW Vestas turbines in the area above Vestmanna. Two years later SEV installed five turbines in Nes (Eysturoy) and in 2014, 13 turbines were erected in Húsahagi near the capital Tórshavn. The total yearly production from the 22 turbines is 55- 60 GWh and the reduction in CO2 equivalents is 25,000 tonnes.

Plans are in place to construct two new windfarms in 2018 and 2019 with a total capacity of respectively 5 MW and 12 MW and the emissions of CO2 equivalents will be reduced by 45,000 tonnes.

The greatest challenges in the future is to ensure a balance between demand and production. The challenge grows with increasing production from unstable sustainable sources – such as wind, hydro, and solar. It is therefore important to develop systems to secure a balanced, sustainable production every hour of the day, all year round, while maintaining security of supply.

In the short term, the thermal plants will secure supply and balancing the grid, when supply from green sources is insufficient. With developments in technology, the green sources in conjunction with energy storage will be able to take over the security of supply from the thermal plants for longer periods, such as in the summer period.

The work to reach 100% green energy on shore in the Faroe Islands by 2030 is based on three main principles. First, the security of supply must be maintained unconditionally, second, all investments must be financially viable, and third is the consideration for the environment. To make the right decisions at the right time is crucial on the green course.

The tangible plan for the green course is a flexible project with the aim to securely and with great care to select the best and least impacting green solutions for the Faroe Islands.

Heating of household and other buildings

In order to make use of the increased power production from wind, electricity will replace heating oil in space heating of houses and buildings. A normal family house use 2,500 litre of heating oil and the emission is 8 ton CO2 a year. A heat pump will reduce the emission with 5 ton, taking into account that a part of the electricity will come from diesel engines. Today there are installed 300 ground source pump and 1,000 air to water / air-to-air heat pumps. The CO2 reduction is 8,000 ton/year.

District heating

Since 1990, parts of the houses in Tórshavn get heat from a District Heating System. The energy originate from incineration of waste and waste heat from the diesel power station in Sund outside Tórshavn. Today 1,100 houses are connected and the reduction of CO2 is 9,000 ton/year.

Regulation on taxes

The total demand to electric power in the Faroe Islands increases both due to normal economic growth and due the changes in energy usage, which is envisaged within domestic transport and heating when the switch from oil and petrol to electric energy takes place in years to come. Electric energy demand is expected to increase from around 350 GWh in 2017 to around 600 GWh by 2030, where all the production shall come from renewable resources.

In order to decarbonise the heat and transport sector the government introduced financial incentives by lowering the tax on electric vehicle and promoting heat pumps by removing VAT on the installation.

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[1] Awaits approval by the European Commission.

[2] The Danish Constitution (Danmarks Riges Grundlov) (http://www.retsinfo.dk/_GETDOCI_/ACCN/A19530016930-REGL /: http://www.folketinget.dk/pdf/constitution.pdf)

[3] http://www.retsinfo.dk/

[4] Under the second commitment period of the Kyoto Protocol, Denmark's base year is 1990 for CO_2, methane and nitrous oxide, and 1995 for the industrial gases (HFCs, PFCs, SF_6 and NF_3 – however with no emissions of the latter) cf. Article 3.8 of the Protocol from the inventory reported, reviewed and resubmitted in 2016 (the review report has not yet been published by the UNFCCC).

[5] Under the Kyoto Protocol, the LULUCF category is dealt with separately under Articles 3.3 and 3.4.

[6] Denmark's CO_2 emissions - the effort in the period 1990-2001 and the associated costs, Report from the Danish EPA, No. 2, April 2005 (Main report http://www.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and Annex report:http://www.mst.dk/udgiv/publikationer/2005/87-7614-589-1/html).

[7] https://www.kvoteregister.dk

[8] For example, an ESCO solution for heat pumps will mean that installers, manufacturers and external finance companies establish an ESCO company that offers the home owner an all-in-one solution. Here the owner again pays only one kWh price and the heat pump + installation is repaid through the energy savings achieved. By this solution, the owner will after the end of the repayment period own the heating installation, but will not notice the savings in the repayment period as the savings are used to pay off the heat pump installation.

[9] After publication of Denmark's Energy and Climate Outlook 2017, new estimates of the future total biogas production have been provided in connection with the government's proposal for the 2018 State Budget. The updated estimate of total biogas production in 2020 is 17.5 PJ.

[10] "Biogasproduktions konsekvenser for drivhusgasudledning i landbruget" Rapport nr. 197 DCE, 2016.

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[20] Following the three sub-tables cf. Annex XI in "COMMISSION IMPLEMENTING REGULATION (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council" (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0749&from=EN) and displaying the current content of the EEA database on EU Member States' policies and measures (PaMs).

[21] Willumsen, 2004

[22] Skjótt syftir seiðir og tunga takið (Easy picking and the long haul). http://www.us.fo/Default.aspx?ID=14087

5

PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

– AND SUPPLEMENTARITY RELATING TO KYOTO PROTOCOL MECHANISMS

5 Projections and the total effect of policies and measures

- and supplementarity relating to Kyoto Protocol mechanisms

5.1 PROJECTION WITH EXISTING MEASURES (WEM-SCENARIO)

5.1.1 Projection of total greenhouse gas emissions

In March 2017, the latest baseline scenario with a projection of Denmark's greenhouse gas emissions 2016-2030 was published by the Danish Energy Agency (*DEA 2017*)[1]. A full documentation report in English with additional projections for 2031-2035 was published in November 2017 by DCE, the Danish Centre for Environment and Energy at Aarhus University (*Nielsen et al. (2017b)*)[2]. As further described below detailed results from the 2017 projection are available in Annex C1.

The purpose of the baseline scenario – the so-called "with (existing) measures" projection or WEM-scenario - is to get an assessment of how energy consumption and emissions of greenhouse gases will evolve in the future if no new policies are introduced. This is often referred to as a "frozen policy" scenario or a "business-as-usual" scenario. The actual development will continue to be influenced by new political initiatives, and the scenario is not considered as a long-term forecast, but rather as a calculation that, on the basis of some given assumptions, we can identify the challenges which future climate policy must address.

The baseline scenario is based on a number of general economic assumptions (the output of industries, private consumption, fuel prices etc.), a number of specific assumptions on technology (what are the costs of different types of plants, what is the efficiency etc.) and assumptions about how the energy market players will act with pure market conditions.

Scenarios of this nature will always be subject to many key and uncertain assumptions. A different development than the assumed may therefore move the result in both directions. The baseline scenario includes the effects of already adopted, but not necessarily implemented, measures.

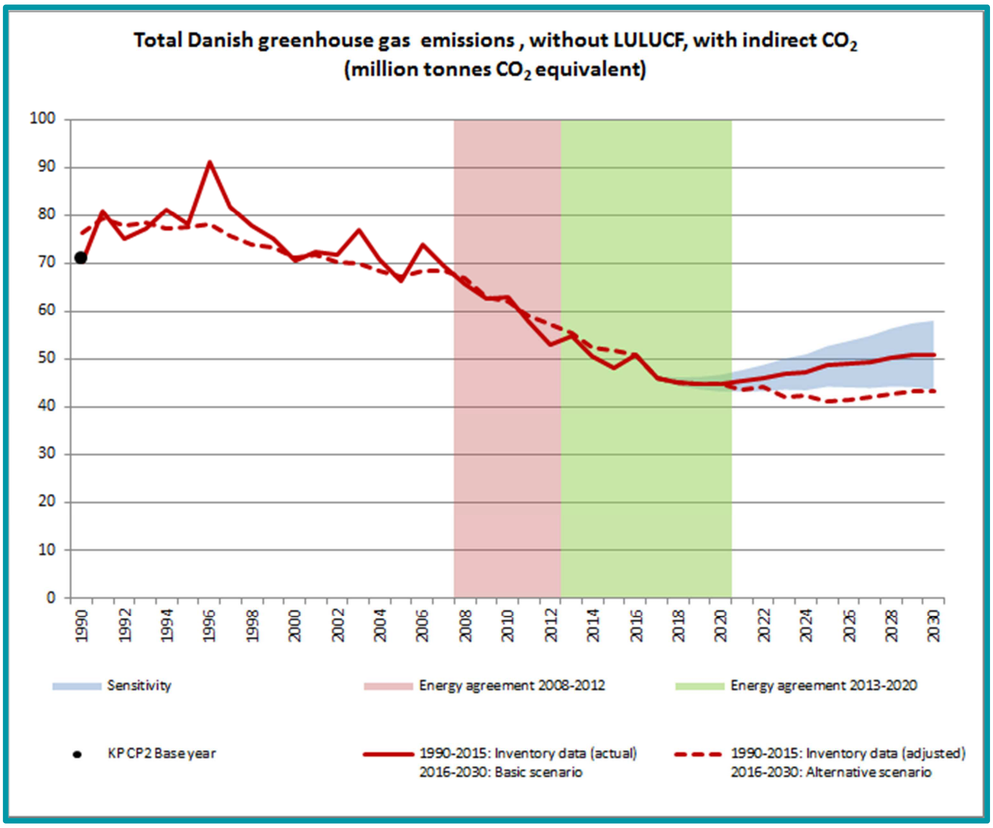
All elements of the Energy Agreement of March 2012 are included in the baseline scenario. In addition, the baseline scenario includes previously agreed actions. The results of the projections are very dependent on these assumptions.

In principle the baseline scenario includes the total effect of the policies and measures described in Chapter 4. However, the total effect of policies and measures is derived at through the use of projection models, assumptions and input parameters rather than calculated as the sum of the effects of individual policies and measures.

One key assumption is that the effects of exisiting policies and measures is reflected in the greenhouse gas emission inventory for the latest historic year for which data are available. For the March 2017 baseline projection preliminary inventory data for 2015 were used. As new knowledge for two source categories ("Agricultural soils" and "Biological treatment of solid waste") was taken into account when the final inventory data for 1990-2015 were re-submitted under the UNFCCC in May 2017, and as this was also the case in the projections included in the projection report published by DCE in November 2017, the projection results presented in this report (both in NC7 and BR3 included as Annex F) also include the revised methane emission time series projected for these two souce categories. This change and one additional difference between the DEA-report and the DCE-report is further explained in Annex C1.The March 2017 projection goes up to 2030 with additional estimates for the period 2031-2035, and its findings are obviously very uncertain.

As shown in Figure 5.1 total Danish greenhouse gas emissions have exhibited a downward trend since the mid-1990s. In 2015, total emissions had fallen by about 27% compared with 1990. Emissions from the energy sector - which include emissions from electricity and district heating production, energy consumption by households and industries, as well as oil and gas extraction and refineries - have traditionally played a significant role in the calculations, but have also exhibited the most significant decrease as a result of Danish conversion of the energy system. Since 1990, the transport sector's share of total emissions has grown steadily due to rising transport needs in the wake of economic development.

FIGURE 5.1 TOTAL DANISH GREENHOUSE GAS EMISSIONS, WITHOUT LULUCF, WITH INDIRECT CO_2 IN THE BASIC SCENARIO (WEM) AND THE ALTERNATIVE SCENARIO UNTIL 2030, 1990-2015 ARE INVENTORY DATA WITHOUT AND WITH ADJUSTMENTS FOR INTERANNUAL VARIATIONS IN ELECTRICITY TRADE AND TEMPERATURE



In connection with the financial crisis in 2008, the rising curve of emissions by the transport sector was broken. In addition to the financial situation, another contributing factor was increased focus on energy efficiency in cars. Emissions from agriculture have been falling since 1990, primarily due to increased efficiency of agricultural production and stricter environmental regulation. The remaining emissions, about 5-7% of total emissions, come from industrial gases, waste and wastewater. These emissions increased from 1990 up to 2000, after which they significantly decreased up to today.

The reduction in the use of fossil fuels means that energy-related CO_2 will be reduced significantly towards 2020. The decrease up to 2020 will mainly occur within energy related emissions, and it is closely linked to implementation of the energy agreements from 2008 and 2012. The fall in emissions is due the deployment of and conversion to renewables, as well as decreased energy consumption as a consequence of energy efficiency improvements.

Starting around 2020, emissions in the basic scenario are expected to increase, primarily due to the discontinuation of many of the elements of the energy policy framework which are currently keeping emissions low. This include support schemes for renewable energy capacity installation and energy saving efforts. With the assumption of no new policy (frozen-policy approach) applied in the baseline scenario (WEM), these schemes will not be replaced by new ones, and this will lead to an increase in emissions. This will primarily be driven by rising energy demand, which will be met by increased consumption of energy based on fossil fuels, particularly coal. The increased consumption of coal will lead to increasing emissions. If new policy decisions are made for the energy area, for example a new energy agreement, conditions and, thus, developments will change accordingly.

The alternative scenario is an illustration of this situation: it assumes that the energy company Ørsted (former DONG) phases out coal by 2023 as announced on February 2017. This situation involves coal being replaced by biomass, which means that coal consumption will first drop and then increase again; however, at a slower rate. As shown in Figure 5.1 this will result in a drop in greenhouse gas emissions up to 2025, after which emissions will rise slightly again up to 2030.

Realised and expected reductions in greenhouse gas emissions compared to the base year 1990/95 are shown in Table 5.1.

TABLE 5.1: REALISED AND EXPECTED REDUCTIONS IN GREENHOUSE GAS EMISSIONS COMPARED TO THE BASE YEAR 1990/95

Source: Denmark's Energy and Climate Outlook 2017, Danish Energy Agency, March 2017.

Emissions in base year 1990/95[1]	**2015**		**2020**[2]			**2030**[2]		
Million tonnes CO_2 equivalents	Million tonnes CO_2 equivalents	Reduction relative to base year, %	Million tonnes CO_2 equivalents	Reduction relative to base year, %	Including sensitivities analysed	Million tonnes CO_2 equivalents	Reduction relative to base year, %	Including sensitivities analysed
70.8[3]	51.9	27%	44.8	37%	34% to 39%	50.9	28%	18% to 38%
Assuming implementation of Ørsted's coal phase-out						43.4	39%	

Note 1: The recalculated and approved base year in relation to the Kyoto Protocol's 2nd commitment period (see chapter 3.5.2).
Note 2: Assuming no new initiatives.
Note 3: As with all other signatories of the UNFCCC, Denmark's baseline year is based on observed emissions on Danish territory in 1990. Emissions this year were unusually low due to plentiful precipitation in Sweden and Norway providing a large supply and low prices for hydropower electricity. Denmark therefore opted to import electricity rather than produce it. Danish emissions would have been a little over 6 million tonnes CO2-eq. higher if adjusted for this electricity trade. In relation to an adjusted and higher baseline year, realised and expected reductions would be about 5 percentage points higher each year.

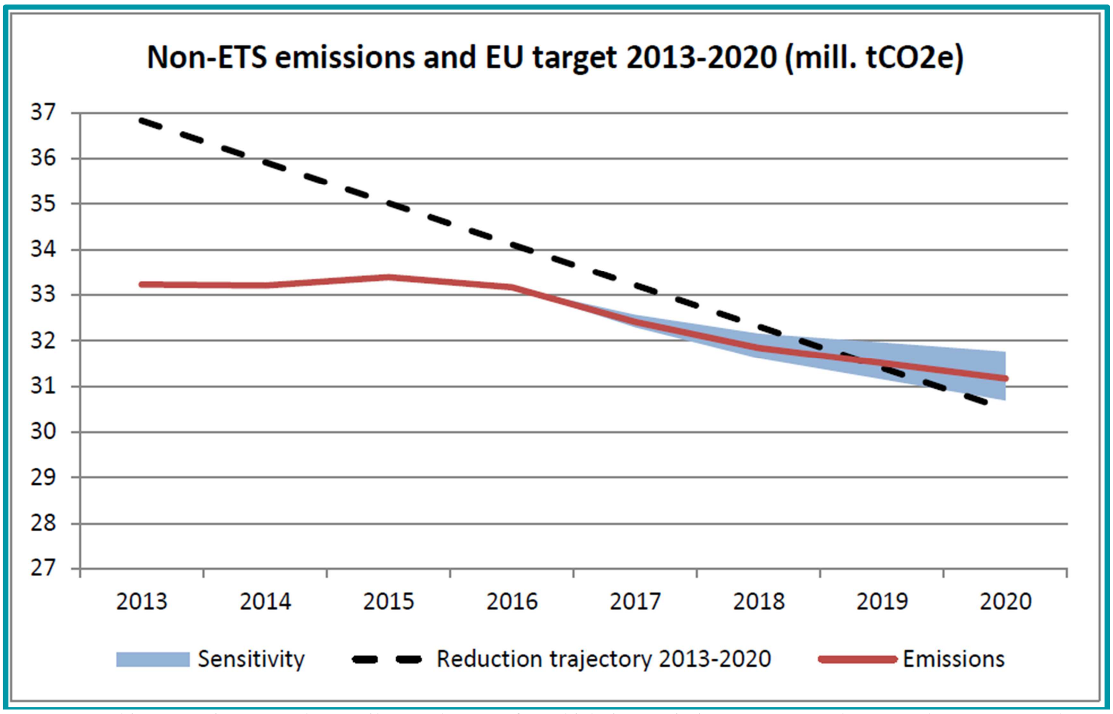
5.1.1.1 Progress towards Denmark's non-ETS target for 2013-2020 in the EU

Under the 2009 EU climate and energy package, Denmark is committed to reducing emissions from non-ETS sectors by 20% by 2020 relative to the 2005 level, as well as to achieving a set of sub-targets up to 2020. These sub-targets become progressively stricter up to the end-target in 2020. Overachievement in one year can be carried forward and used for target achievement in the subsequent year.

Overachievement is expected for the period 2013-2018. In 2019 the sub-target will be more or less reached, and 2020 will see an underachievement of slightly less than

1 million tonnes CO_2-eq. as shown in Figure 5.2. As previous years' overachievement may be carried forward and used for target performance in years with underachievement, Denmark is expected to achieve its reduction commitments. A total, accumulated overachievement of about 9 million tonnes CO_2-eq is expected for the whole commitment period. When sensitivities are taken into account, the 2020 underachievement is expected to be between 0 and 1.5 million tonnes CO_2-eq. A total, accumulated overachievement of between 8 and 11 million tonnes CO_2-eq is expected for the whole period when including sensitivities[3].

FIGURE 5.2 GREENHOUSE GAS EMISSIONS IN DENMARK'S NON-ETS SECTORS IN THE BASELINE (WEM) SCENARIO UNTIL 2020, 2013-2015 ARE OBSERVED.



Note: Overachievement is expected up until around 2019, after which time emissions are expected to exceed targets. Note that the y axis does not begin at 0.

5.1.1.2 Progress towards Denmark's preliminary non-ETS target for 2030 in the EU

As mentioned in Chapter 4, the Danish government has increased its ambition and in October 2017 agreed to a further reduction in non-ETS emissions in the period 2021-2030, rising to 39% by 2030 relative to 2005 under the draft EU Effort Sharing Regulation for which final approval is pending (the European Parliament and the European Council reached a provisional agreement on the effort sharing regulation on 21 December 2017).

The Energy Agreement from March 2012 has brought Denmark a long way towards realising the 2020 target. This is illustrated in Figure 5.2. However, significant additional efforts will be needed to reach the 2030 target.

The baseline scenario projections show a fall in total emissions up to 2020 after which emissions will begin to rise. The decrease up to 2020 will mainly occur within energy related emissions, and it is closely linked to implementation of the energy agreements from 2008 and 2012. The fall in emissions is due the deployment of and conversion to renewables, as well as decreased energy consumption as a consequence of energy efficiency improvements.

After 2020, many of the existing energy policy framework elements will cease to apply, including support schemes for renewable energy capacity installation and energy saving efforts. With the assumption of no new policy (frozen-policy approach) applied in the projections, these schemes will not be replaced by new ones, and this will lead to an increase in emissions. This will primarily be driven by rising energy demand, which will be met by increased consumption of energy based on fossil fuels, particularly coal. The increased consumption of coal will lead to increasing emissions.

Under an alternative scenario, which involves realisation of Ørsted's (the former DONG Energy) announced phase-out of coal by 2023, the rise in coal consumption will be considerably more modest and will not begin until the middle of the 2020s. Emissions are expected to drop in a period up to 2025, after which they will begin to rise again, but at a much slower rate than in the basic scenario. Conversion from coal to biomass is part of the reason for the difference between the alternative scenario and the baseline scenario; another part of the reason is increased imports of electricity to cover rising electricity consumption.

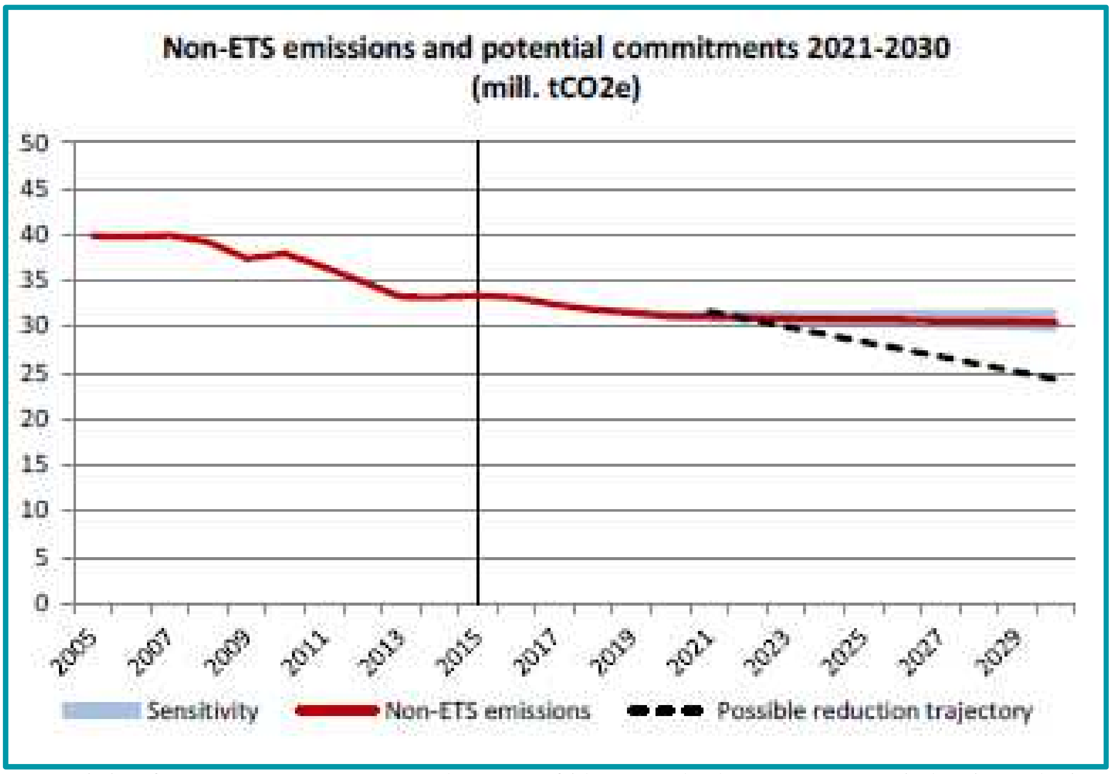
Both without and with the Ørsted scenario additional efforts will be required to reach the reduction target for the period 2021-2030.

On 20 July 2016, the European Commission published a proposal for climate efforts for non-ETS sectors for the period 2021-2030. The proposal contains both effort sharing and the framework for achievement of targets. On 13 October 2017 the EU Member States and the European Commission reached an agreement on non-ETS targets for the Member States and the on the framework. Final agreement with the European Parliament is now pending (a provisional agreement on the effort sharing regulation was reached on 21 December 2017). Thus, all assessments on the consequences of the agreement are therefore subject to the reservation that the final outcome might look different.

The framework for efforts is essentially the same as for the period 2013-2020, with one target for 2030 and progressively stricter binding annual sub-targets up to 2030. By 2030, Denmark must reduce its non-ETS emissions by 39% relative to 2005. However, the absolute target in tonnes in 2030 as well as the target path starting in 2021 will not be finally decided until later. There is also uncertainty with regard to the projections themselves. In addition to this, the agreed framework with new internal EU flexibility mechanisms could also change before final agreement is reached with the European Parliament. All in all, this means that the assessments of reduction needs are subject to considerable uncertainty.

Even so, the challenge facing Denmark can already now be outlined, if we look exclusively at the projected emissions and the expected commitments. This is shown in Figure 5.3.

FIGURE 5.3 GREENHOUSE GAS EMISSIONS IN DENMARK'S NON-ETS SECTORS IN THE BASELINE (WEM) SCENARIO UNTIL 2030, 2005-2015 ARE OBSERVED.



Note: Emissions from non-ETS sectors are expected to stay at a fairly constant level up to 2030. Progressively stricter reduction targets mean that a climate deficit will accumulate up to 2030. This reduction trajectory represents a best estimate and, with regard to start and end points, is based on data from Denmark's Energy and Climate Outlook 2017 (as reassessed in May 2017).

By 2030, Danish non-ETS emissions are likely to have been reduced by between 20% and 26% relative to the 2005 level, which is not enough to meet the target without additional reduction efforts or the use of possible flexible mechanisms. On the basis of these assumptions, it is anticipated there will be an overall need for accumulated additional reductions of between 21 to 38 million tonnes CO_2-eq. (middle estimate of around 28 million tonnes) over the entire period 2021-2030, and between 5 and 8 million tonnes in 2030, if Danish non-ETS emissions are to be in line with the reduction target.

One of the non-ETS framework's new EU internal flexible mechanisms is the option of using the so-called LULUCF credits, which represent the carbon sequestration or uptake by soil and plants in Denmark. According to the agreement reached on 13 October 2017 Denmark may use up to 14.6 million tonnes of LULUCF credits in total 2021-2030 (see Box 5.1). Under the proposed regulations LULUCF credits 2021-2030 are expected to be generated at a volume above this limit However, it should be noted that the projections of future LULUCF credits are very uncertain. Additionally, the proposal contains a number of other flexible mechanisms such as limited access to the use of ETS allowances for non-ETS target achievement or the trading of emission rights between EU countries.

BOX 5.1 LULUCF - CARBON SEQUESTRATION

The sequestration or uptake of CO_2 by soil, plants and trees, known as LULUCF (Land-Use, Land-Use Change and Forestry) also plays a role in climate efforts. There is potential for enormous uptake or emissions in connection with land use just due to the size of the carbon pools in question.

It can be relatively difficult to determine the uptake and emissions from land use. There is therefore great uncertainty in connection with these estimates - both in connection with historical figures and the projected figures.

In addition to the complexity of natural science methodologies used to calculate LULUCF contributions, the rules for applying LULUCF in the climate accounts are also difficult. Different regulations apply to different commitment periods. Under the United Nation's Kyoto Protocol, LULUCF could be used in the period 2008-2012 but with certain restrictions. An equivalent framework for LULUCF for the period 2013-2020 has not yet entered into force, and in connection with the EU's own efforts 2013-2020, it is not been possible for Member States to use LULUCF credits for the achievement of their EU non-ETS target.

It has been preliminary agreed that LULUCF credits may, to a certain extent, be used in European efforts in the period 2021-2030. This means that Denmark might have the option of utilizing up to 14.6 million tonnes CO_2-eq. of LULUCF credits during that period. The contribution is determined based on emissions from cultivated lands in comparison with the average emissions levels in the years 2005-2007. Credits will be generated if emissions have dropped since then and vice versa. With the current projections and methodology used to calculate LULUCF, 17.6 million tonnes CO_2-eq. of LULUCF credits are expected to be generated from Danish soil in the period 2021-2030 (in the first estimate shown in the DEA-projection report from March 2017 there was an error – resulting in an erroneous estimate of 44 million tonnes CO_2-eq. LULUCF credits). Note that estimates on LULUCF contributions are subject to considerable uncertainty due to the fact that even relatively small adjustments to methodology can result in very different results.

5.1.1.3 Progress by sector and by gas

Based on baseline scenario projections of activity data from sectors with greenhouse gas emissions, e.g. energy consumption in the energy sector, number of livestock in the agricultural sector etc., projections of greenhouse gas emissions are calculated.

The main sector categories in the greenhouse gas projections are the same as those defined in the IPCC guidelines for greenhouse gas inventories with the split of AFOLU into agriculture and LULUCF adopted under the UNFCCC :

- Energy (Fuel Combustion, including Transport, and Fugitive Emissions from Fuels)
- Industrial Processes and Product Use
- Agriculture
- LULUCF (Land-Use, Land-Use Change and Forestry)
- Waste

The energy-related CO_2 emissions account for the vast majority of Denmark's total emissions of greenhouse gases.

A major part of the energy-related CO_2 emissions falls under the EU Emissions Trading System (EU ETS), not least electric utilities. Changes in these emissions do not directly influence Denmark's compliance with reduction commitments under the Kyoto Protocol, since the final result for Denmark's accounting of emissions and credits under the Kyoto Protocol is determined by the quota for Danish installations covered by the EU ETS. In case of emissions above the quota, the responsible entities under the EU ETS have to buy and surrender extra quotas or credits to cover this excess of emissions. This means that the excess of emissions are covered by an equivalent amount of emission reductions elsewhere. Although the amendment to the

Kyoto Protocol for the second commitment period and Denmark's commitment thereunder has not yet entered into force, Denmark will comply as if it has entered into force due to the EU legislation defining Denmark's share in fulfilling the joint EU target for the period 2013-2020.

Table 5.2 and Figure 5.4 show Denmark's emission of greenhouse gases from Denmark's base year (i.e. without Greenland) under the 2nd commitment period under the Kyoto Protocol ("KP2 BY") to 2035 for the main IPCC sector categories mentioned above together with total greenhouse gas emissions with and without LULUCF. As in Denmarks target 2013-2020 indirect emissions of CO_2 are also included for the whole period. Figures for emissions in the period 1990-2015 are from the National Inventory Report (NIR) submitted under the UNFCCC and the Kyoto Protocol in May 2017, and figures for emissions in the period 2016-2035 are from the March 2017 baseline or "with measures" projection scenario.

The full set of tables with the results from the March 2017 baseline scenario is included in Annex C1.

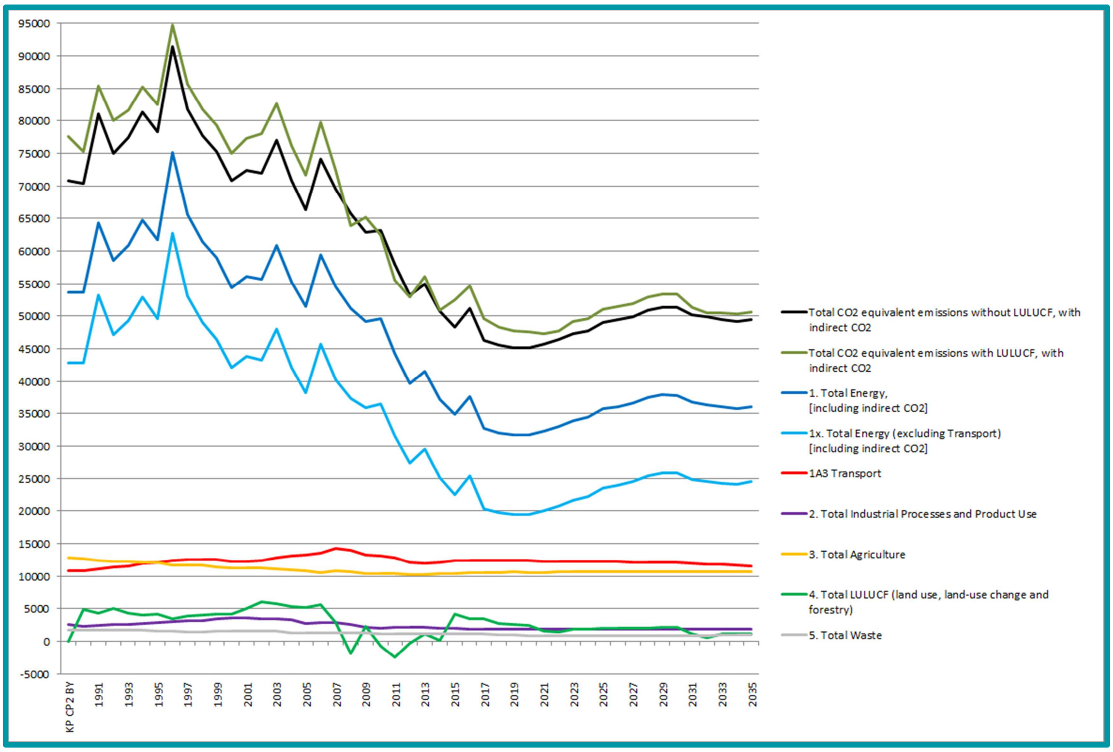
TABLE 5.2 GREENHOUSE GAS EMISSIONS IN DENMARK (I.E. WITHOUT EMISSIONS IN GREENLAND AND FAROE ISLANDS) IN KT OF CO_2 EQUIVALENTS FOR MAIN IPCC SECTORS – INCLUDING ENERGY WITH AND WITHOUT TRANSPORT, 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.

GHG emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**70793**	**70356**	**78282**	**70786**	**66371**	**63217**	**60609**	**48331**	**48419**	**45090**	**49059**	**51269**	**49502**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	70802	75259	82472	74994	71611	62420	59974	52484	50850	47456	50923	53283	50540
1. Total Energy, [including indirect CO_2]	**53600**	**53619**	**61727**	**54414**	**51519**	**49667**	**46785**	**34888**	**34922**	**31747**	**35691**	**37836**	**36024**
1x. Total Energy (excluding Transport) [including indirect CO2]	42866	42885	49634	42129	38276	36542	33756	22552	22665	19422	23497	25807	24531
1A3 Transport	10733	10734	12093	12285	13242	13125	13030	12336	12258	12325	12195	12029	11493
2. Total Industrial Processes and Product Use	**2644**	**2343**	**2878**	**3631**	**2789**	**2034**	**2199**	**1992**	**1964**	**1910**	**1844**	**1824**	**1857**
3. Total Agriculture	**12784**	**12631**	**12079**	**11228**	**10788**	**10326**	**10406**	**10299**	**10469**	**10572**	**10629**	**10702**	**10696**
4. Total LULUCF (land use, land-use change and forestry)	**9**	**4902**	**4190**	**4208**	**5240**	**-797**	**-635**	**4153**	**2431**	**2366**	**1864**	**2014**	**1038**
5. Total Waste	**1765**	**1763**	**1598**	**1513**	**1276**	**1190**	**1218**	**1153**	**1063**	**861**	**894**	**908**	**926**
GHGs (kt CO_2eq.) without LULUCF	**70793**	**70356**	**78282**	**70786**	**66371**	**63217**	**60609**	**48331**	**48419**	**45090**	**49059**	**51269**	**49502**
CO_2 (kt CO_2)	**54785**	**54808**	**62752**	**55170**	**52257**	**49727**	**47148**	**35559**	**35672**	**32686**	**36758**	**39005**	**37276**
CH_4 (kt CO_2eq.)	**7864**	**7624**	**8051**	**7907**	**7671**	**7347**	**7261**	**6849**	**6796**	**6518**	**6606**	**6651**	**6617**
N_2O (kt CO_2eq.)	**7799**	**7882**	**7134**	**6926**	**5472**	**5139**	**5210**	**5182**	**5290**	**5415**	**5460**	**5473**	**5481**
F-gases (kt CO_2eq.)	**344**	**42**	**344**	**782**	**971**	**1005**	**990**	**742**	**661**	**472**	**235**	**141**	**127**
GHGs (kt CO_2eq.) with LULUCF	70802	75259	82472	74994	71611	62420	59974	52484	50850	47456	50923	53283	50540
CO_2 (kt CO_2)	54794	59664	66888	59316	57426	48851	46434	39618	38011	34956	38525	40920	38214
CH_4 (kt CO_2eq.)	7864	7643	8078	7943	7715	7399	7313	6909	6857	6583	6672	6717	6684
N_2O (kt CO_2eq.)	7799	7909	7161	6953	5499	5166	5237	5216	5320	5445	5491	5505	5515
F-gases (kt CO_2eq.)	344	42	344	782	971	1005	990	742	661	472	235	141	127

FIGURE 5.4 GREENHOUSE GAS EMISSIONS IN DENMARK (I.E. WITHOUT EMISSIONS IN GREENLAND AND FAROE ISLANDS) IN KT OF CO_2 EQUIVALENTS, TOTAL EXCLUDING AND INCLUDING LULUCF AND FOR THE MAIN IPCC SECTORS – INCLUDING ENERGY WITH AND WITHOUT TRANSPORT, 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.



The developments in greenhouse gas emissions by sector has shifted over time because changes are primarily occurring in the energy sector. In 1990, energy related emissions in Denmark accounted for 60% of total emissions, while transport and agriculture both accounted for 16% respectively. Additional sources jointly accounted for only 5% of total emissions. This situation was vastly different in 2015. Energy related emissions had been almost halved and accounted for less than 50% of total emissions while transport emissions had increased by a quarter. The share of emissions from agriculture had also increased to 20% despite absolute emissions for the sector having decreased by 18% since 1990.

This development is expected to continue until the current energy agreement expires in 2020. Transport and agriculture will both account for an increasing share of total emissions, and simultaneously slightly increase absolute emissions. The share of emissions by the energy sector is expected to decrease to just over 40% and absolute emissions are expected to have been reduced by 60% compared to levels in 1990.

After 2020, emissions from both transport and agriculture will remain mostly unchanged up to 2030 - agriculture will increase slightly while transport will decrease slightly. In the basic scenario, energy related emissions are also expected to increase again up to 2030. This means that the energy sector's share of total emissions will increase to almost 50% again, while the share of other sectors will decrease correspondingly.

In connection with Ørsted's plan to end the use of coal at its power plants by 2023 (the alternative scenario), energy related emissions are expected to decrease and then increase slightly up to 2030. In this situation, energy related emissions will account for about 40% of total emissions in 2030.

Although CO_2 is the predominant greenhouse gas in Denmark's total greenhouse gas emissions, the basic scenario also shows a decline in other greenhouse gases.

The following chapters contain further projection information by sector and by gas.

5.1.2 Energy (Fuel Combustion, including Transport, and Fugitive Emissions from Fuels)

This section decribes the projection of the total emissions of CO_2, CH_4 and N_2O from combustion of fuels and from fugitive emissions from fuels. The projections of combustion of fuels include all fuel-consuming sectors. A more detailed description of the approach used in the energy projection is included in Annex C2.

5.1.2.1 Methods

Based on a projection of the development in energy consumption in the period 2016-2030/2035, projected emissions of CO_2, CH_4 and N_2O from combustion of fuels have been calculated by multiplying the fuels' related energy consumption by emission factors.

The projection of end-user energy consumption by the business and domestic sectors is based on an ADAM/EMMA projection. EMMA is a macro model that describes the final energy consumption broken down into a number of sectors and seven types of energy. It is based on historical experience with the behaviour of businesses and households and is documented in NERI 1995[4].

In EMMA, energy consumption in the business sector is determined by three factors: production, energy prices/taxes and energy efficiencies/ trends. Increased production will increase the demand for energy input, whereas increased energy prices and taxes will pull in the direction of a more limited demand for fuels. Improved energy efficiency will mean that production can be maintained using less energy, and in EMMA this results in reduced energy consumption.

The projection of production by businesses is based on the latest ADAM projection from the Danish Ministry of Finance (FFL2017, August 2016).

The projection of electricity and heat production is based on the Danish Energy Agency's RAMSES model, using as the basis the demand for electricity and district heating according to the projection of the consumption sectors. In the projection, electricity and heat production is divided between existing and possible new production plants on the basis of technical specifications and prices of fuels and CO_2 allowances. The model also determines electricity prices on the Nordic market and the degree of electricity exchange with the other Nordic countries. In this regard it takes account of the limitations in exchange capacity. Electricity production has been liberalised throughout the Nordic region and therefore it is not closely linked to Danish demand, but rather to the characteristics of the individual power plant and market prices. Industrial and local mini-CHP production is not projected in the RAMSES model, therefore a separate (bottom-up) projection has been made of this production.

The projection of emissions from other sectors (primarily from extraction of oil and gas as well from as oil refineries) is based on data on expansion plans and ad-hoc assumptions. For these sectors the projections include both fuel combustion emissions and fugitive emissions.

The projection of of emissions from transport is carried out with the Transport Model, which models energy consumption by the transport sector.

The basis for the emissions projections is the official Danish national fuel consumption projections from the DEA (2017). These activity data are used in combination with sector-specific emission factors derived from emission models developed at DCE for road transport, aviation, railways, sea transport and working machinery. More in-depth documentation can be seen in *Nielsen et al. (2017b).*

5.1.2.2 Assumptions and key parameters

In general, the projection is based on the policies implemented or adopted before March 2017, including the Agreement on Danish Energy Policy from March 2012. The projection is based on energy consumption in 2015. The basic assumption is that energy consumption in the future will equal the 2015 level, unless there is a drop in economic activity, and/or prices, technical improvements, initiatives, climate, etc. change. Therefore, only initiatives where the effect will change in relation to 2015 (including new initiatives) are included specifically when calculating the projection. Therefore, the projection should be regarded as a ”with (existing) measures” projection (WEM-scenario).

The IEA price assumptions for fossil fuels (World Energy Outlook – New Policy scenario, 2016) have been applied. Prices of biomass are based on an analysis prepared by an external consultant in 2016. District-heating prices are based on production costs, while the price of electricity, as mentioned above, has been calculated on the basis of marginal production costs.

Other assumptions behind the energy projection are economic growth of about 1.1-1.9 per cent p.a. and prices of CO_2 allowances of about EUR 6 per tonne in 2020 – increasing to about EUR 10 per tonne in 2030.

In Table 5.3 a number of key assumptions for the projections are shown.

TABLE 5.3 GROWTH ASSUMPTIONS[1]

Source: Danish Energy Agency

	Units		2015	2020	2025	2030	2035
Gross Domestic Product	Million € 2010 constant prices prices		249,000	270,000	289,000	305,000	305,000
Gross domestic product growth rate [1]	Per cent Annual growth rate		1.0%	1.9%	1.2%	1.6%	0.0%
Population	1000 pers.		5700	5800	6000	6100	6100
Population growth rate	Per cent p.a.		0.35%	0.35%	0.67%	0.33%	0.00%
International coal prices	2016 prices, €/GJ		2.1*	2.1	2.3	2.5	2.5
International oil prices	2016 prices, €/GJ		6.7*	10.5	12.1	13.7	13.7
International gas prices	2016 prices, €/GJ		4.4*	5.1	7.1	8.7	8.7
Carbon price	2016 prices, €/t CO_2		5.4*	6.0	7.6	10.1	10.1

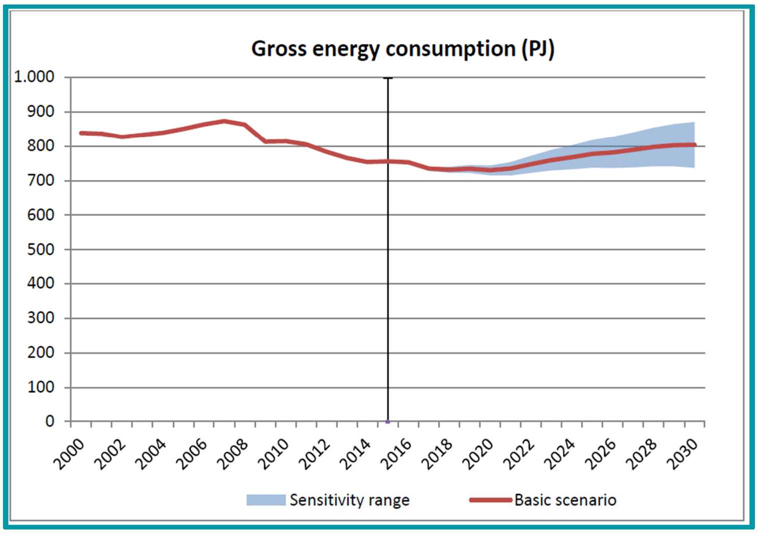
[1] The growth rates are from *The Danish Finance Ministry (FFL 2017, August 2016)* , * For 2016.

5.1.2.3 Results

Gross energy consumption

Danish Danish gross energy consumption has been more or less constant since 1990 (see Figure 5.5) and has been following a slightly downward trend since 2000, while GDP has increased considerably. Looking forward toward 2030, energy consumption is likely to be slightly higher towards the end of the period than it is today. However, this trend reflects a continued slight drop up to 2020 followed by an increase in demand up to 2030. The drop in energy consumption up to 2020 is due primarily to energy efficiency improvements and new wind power capacity[5] (including the establishment of Kriegers Flak), while the expected increase in consumption after 2020 is due to a halt in the installation of new wind power capacity, fewer energy efficiency improvements and increased electricity demand from new data centres.

FIGURE 5.5 GROSS ENERGY CONSUMPTION 2000-2030, 2000-2015 ARE OBSERVED
Source: Danish Energy Agency



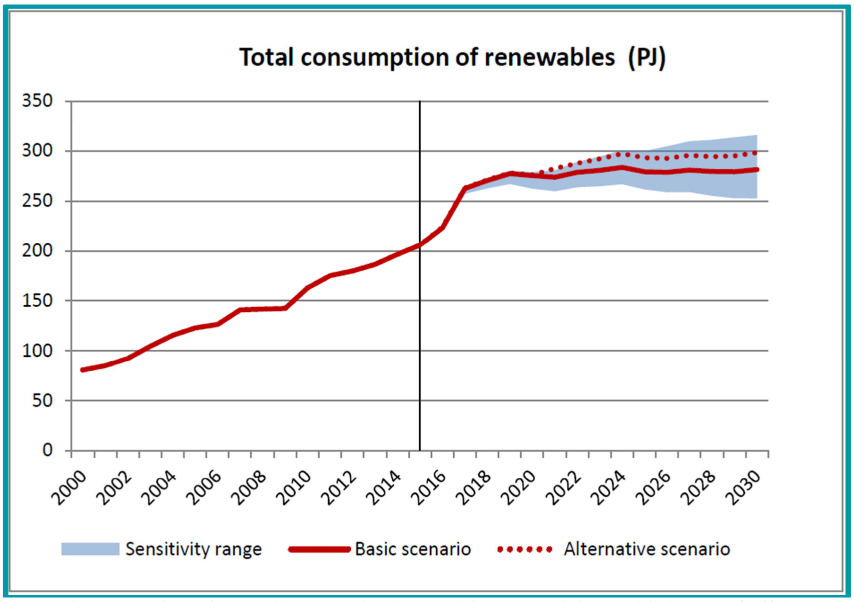
Note: Following a slightly downward trend from 2000 to 2020, gross energy consumption will increase slightly from 2020 to 2030.

Total consumption of renewable energy will increase significantly from 2016 to 2019, after which time it will stay at a more or less constant level up to 2030 (see Figure 5.6). The increase early in the projection period is due primarily to the conversion of large-scale CHP plants to biomass in combination with the deployment of new wind power capacity.

After 2020, many of the large-scale power plants will have been converted to biomass-based production, and no more conversions are expected under the basic scenario. No more offshore wind farms have been approved for establishment after Kriegers Flak has been fully commissioned in 2021, and in February 2018, the EU's approval of state aid for onshore wind expires. Consequently, subsidies for onshore wind capacity have not been included after 2018, which is one among several reasons why the increase in renewable energy consumption will stagnate after 2019 under the basic scenario. There will be a significant increase in electricity production from photovoltaic solar modules, since there will continue to be a self-generation incentive. However, electricity production from photovoltaic solar modules will continue to play a minor role for the overall picture.

As mentioned above, we have also prepared an alternative scenario. In this scenario, consumption of renewable energy after 2020 will be slightly higher compared with the basic scenario. This is due to increased consumption of biomass as it has been assumed that DONG Energy's plants will be fired exclusively by biomass under this scenario.

FIGURE 5.6 TOTAL CONSUMPTION OF RENEWABLES 2000-2030, 2000-2015 ARE OBSERVED
Source: Danish Energy Agency



Note: The conversion of several large-scale plants to biomass and the establishment of offshore wind farms will lead to an increase in renewables from today up to 2020, after which time these initiatives will end and the increase in renewables will therefore stagnate.

Renewable share and targets

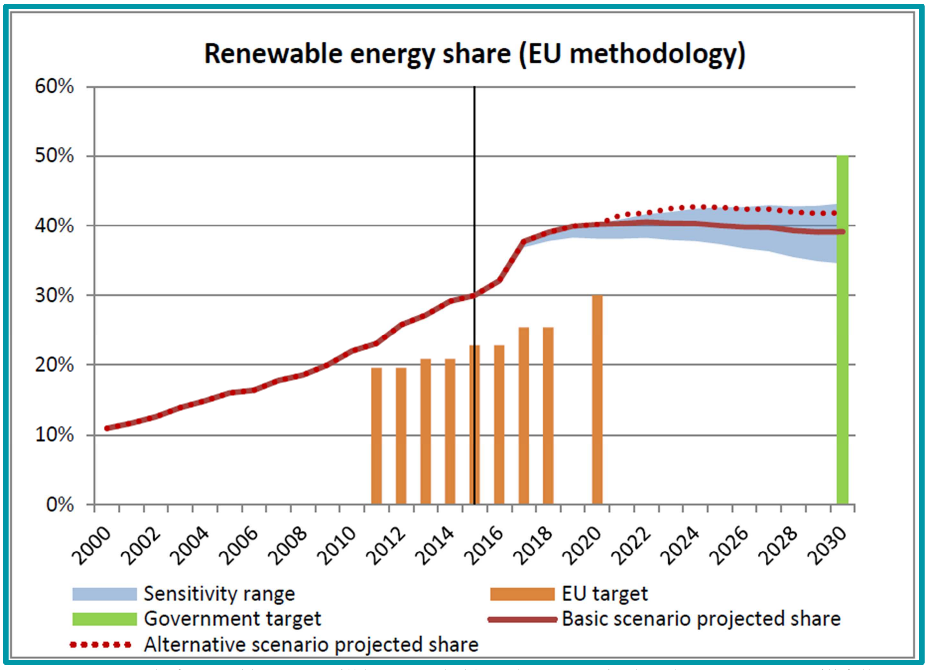
Under the 2009 EU Climate and Energy Package, Denmark is committed to achieving at least 30% renewables in gross final energy consumption[6] by 2020, as well as various sub-targets before 2020. With a projected renewable share of 40% in 2020, this target will have been exceeded by a large margin (see Figure 5.7). Annual targets up to 2020 will also be reached by a large margin. The increase in the renewable share from today and up to 2020 will be due, in particular, to the conversion of large-scale plants to biomass, as well as to the deployment of more offshore wind power capacity, including the establishment of the Horns Rev 3 and Kriegers Flak offshore wind farms; however, it will also be due to continued energy savings leading to less consumption.

In 2014, the EU committed to a 27% renewable energy share of consumption for the EU as a whole by 2030. However, this target has not been translated into national targets. Instead, from 2018, in national energy and climate plans, Member States must account for their expected contribution to achieving the common EU target for renewable energy by 2030, as well as for their ambitions to deploy renewable energy after 2021.

The current Danish government platform includes a target of at least 50% renewables by 2030. According to the basic scenario, the renewable share of gross final energy consumption will be around 35-43% in 2030 as shown in Figure 5.7. The standstill in the increase of the renewable share will be primarily due to a halt in biomass-conversion of plants and in new wind power capacity installation, in combination with increased energy consumption. The government's 2030 target will therefore not be achieved, unless new policy is introduced to ensure this.

Under the alternative scenario, the increase in the renewable share will not stagnate until after 2024. In 2030, the renewable share will be around 3 percentage points higher in the alternative scenario than in the basic scenario. The alternative scenario will have a higher share of renewable energy due to more use of biomass.

FIGURE 5.7: RENEWABLE ENERGY SHARE (EU METHODOLOGY)
Source: Danish Energy Agency.



Note: EU targets before and by 2020 will be exceeded by a large margin, but the government will fall short of the 2030 target by 7-15 percentage points.

Renewable energy targets for transport

The EU Climate and Energy Package also includes a separate target for renewables in the transport sector, by which Denmark is obligated to reach a renewable share in land-based transport of at least 10% by 2020. This target only applies for 2020 with no requirements for sub-targets towards 2020.

The Danish 2012 Energy Agreement included a decision to amend the Danish Biofuel Act so as to ensure a mix of 10% biofuels in transport fuels by 2020. However, implementation of this is pending an analysis of alternative routes to achieving the renewable energy target. Without this change, the share of biofuels in transport in 2020 will not be enough to ensure an overall renewable share of 10% by 2020. However, the expected 5.5% biofuel share[7] in 2020, in combination with the electrification of railways, will result in an overall renewable share of 8.7%.

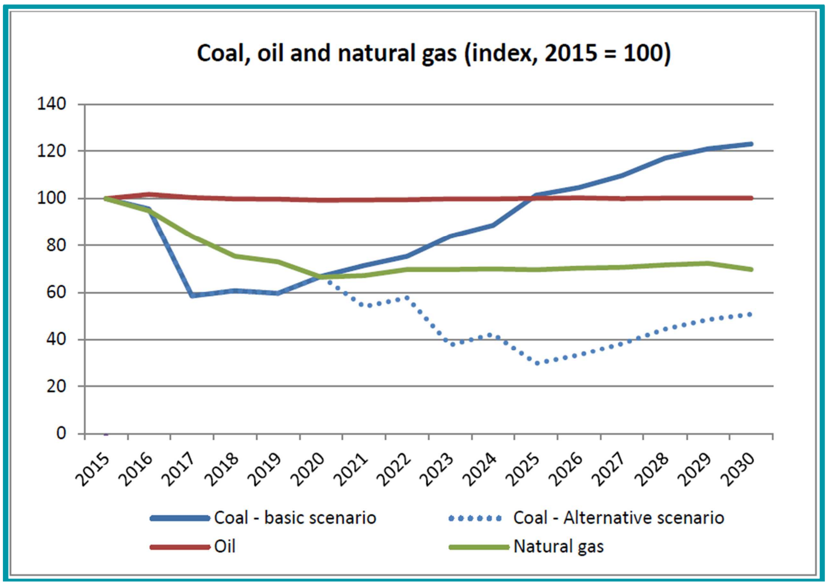
Fossil fuels consumption

For many years, Denmark has seen falling consumption of fossil fuels; a trend that is expected to continue up to 2020. After 2020, a decline in the efficiency improvements in energy consumption, increased demand for electricity e.g. from data centres, and a halt in the installation of new wind power capacity will mean that consumption of fossil fuels will go up. In overall terms, consumption of fossil fuels will fall from around 650 PJ in 2010 to 450 PJ in 2020 (an approx. 30% reduction); however, by 2030 consumption will have increased to 520 PJ. The increase will be due, in particular, to an increase in coal-based electricity generation, while consumption of oil and natural gas is projected to stay at a relatively constant level after 2020 as shown in Figure 5.8.

Under the alternative scenario, coal consumption will not start to rise until after 2025. This scenario assumes conversion to biomass of one additional plant and it assumes that none of DONG's plants will exploit the possibility to use coal in production of electricity and district heating (several of the plants can usually shift between coal and biomass depending on prices). Therefore, this scenario projects a lower consumption of coal than the basic scenario. In the alternative scenario, the increased electricity demand will instead be by met by electricity imports, but this scenario is sensitive to developments in fuel prices and to the energy mix in neighbouring countries.

FIGURE 5.8 COAL, OIL AND NATURAL GAS (INDEX, 2015 = 100) 2015-2030, 2015 IS OBSERVED

Source: Danish Energy Agency



Note: Consumption of oil and natural gas is projected to stay at a relatively constant level after 2020, while coal consumption will increase due to increased electricity consumption. However, in the alternative scenario the increase in electricity consumption will be met by an increase in imports.

Further specific energy projection information regarding Production of electricity and district heating, Household energy consumption, Energy consumption by the business sector and Energy consumption by the transport sector is contained in Annex C2.

Emissions of energy-related CO_2 and other greenhouse gases

In energy statistics, energy-related CO_2 emissions from Denmark’s gross energy consumption is calculated (the total input of primary energy to the energy system), including both the actual and corrected consumption, where the corrected consumption is corrected for electricity trade. At the same time gross energy from fuels used in Denmark is calculated.

In the international greenhouse gas inventories, emissions from combustion are defined as emissions from fuels sold in Denmark, and therefore include emissions that relate to cross-border trade with petroleum products (gasoline, gas-/diesel and petroleum coke). Also, emissions from flaring is included, but not emissions from international aviation.

The actual energy-related CO_2 emissions are sensitive to changes in electricity exchange and are therefore difficult to use to assess the trend of development. CO_2 emissions associated with the electricity exchange will also predominantly be covered by the European Union Emission Trading Scheme (EU ETS). By correcting emissions for electricity trading, the fluctuations caused by climate fluctuations (particularly precipitation in the Nordic countries) and temporary capacity factors (e.g. extraordinary outage times for nuclear power) are eliminated. The development in corrected emissions better reflect the trend in emissions related to the Danish energy consumption.

The corrections are only used for the historic data and only for domestic puposes. The trend in corrected total greenhouse gas emission is shown in Chapter 3. For the projection period the projected electricity trade is eliminated in the emission projections as conservative estimates are preferred. In the results from the energy projection models a tendency appears where Denmark is a net importer of electricity. These imports are very sensitive in relation to external factors such as rainfall in Norway and Sweden and operational stability in nuclear power plants. Variations in these factors contribute significantly to the historical fluctuations in actual emissions. In order to take into account the high uncertainty regarding the size and direction of the electricity trade, the greenhouse gas emissions projections are calculated as if the trade situation was neutral (i.e. no net import/export in the years of the projection period)

Total greenhouse gas emissions decline in the scenario period until 2022/2024, as a result of the substitution of fossil fuels with CO_2-neutral renewable energy, as previously described due to the changes in gross energy consumption. After 2024 emissions will increase again if the expiring policies an mesures from the 2012 Energy Agreement is not replaced by new or extention of existing policies and measures expire in a new energy agreement. As mentioned in Chapter 4 the government will put forward a proposal for a new energy agreement in 2018.

The results of the projections of total greenhouse gas emissions from energy, including transport 2016-2035, are shown in Table 5.4 and Figure 5.9 together with the corresponding historic emission inventories for 1990-2015. As with the historical emissions inventories, the national totals for projected emissions of greenhouse gases do not include emissions from international air transport and international marine transport.

TABLE 5.4 PROJECTION OF GREENHOUSE GAS EMISSIONS IN KT OF CO_2 EQUIVALENTS FOR ENERGY INCLUDING TRANSPORT – AND EXCLUDING TRANSPORT , 1990-2015 ARE OBSERVED.

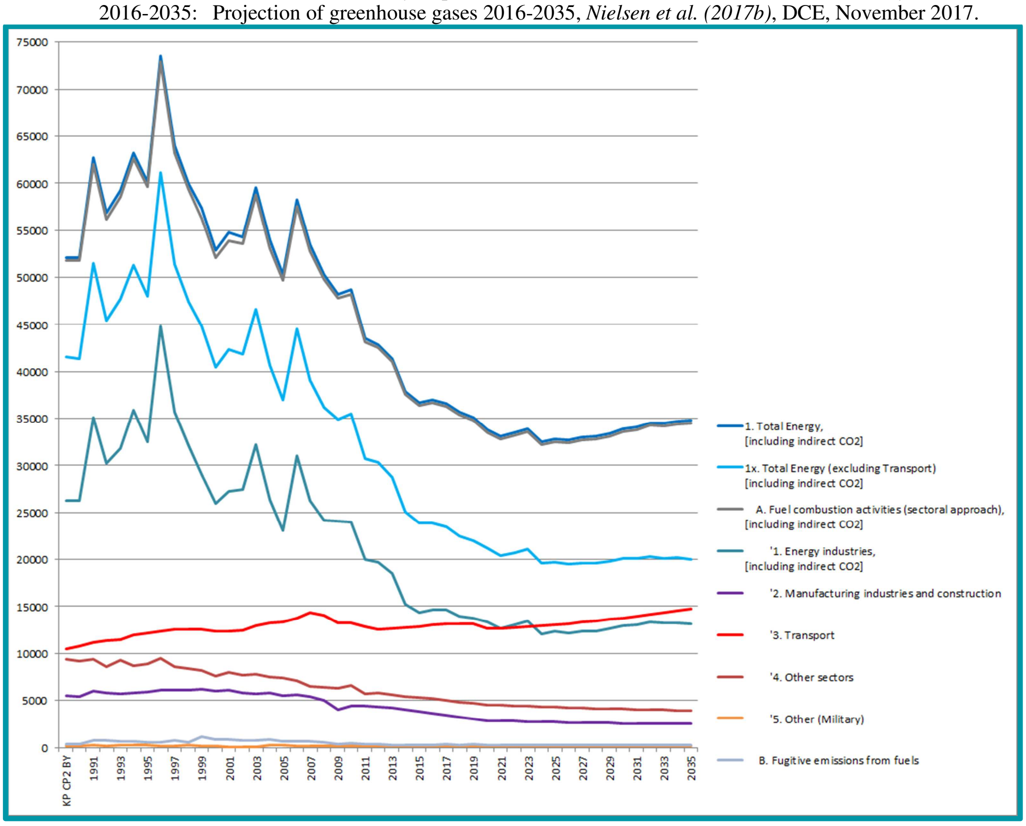
Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*,DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

GHG emissions and projections (kt CO_2 equivalents)		KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
1. Total Energy,	**[including indirect CO2]**	**53600**	**53619**	**61727**	**54414**	**51519**	**49667**	**46785**	**34888**	**34922**	**31747**	**35691**	**37836**	**36024**
1x. Total Energy (excluding Transport)	[including indirect CO2]	42866	42885	49634	42129	38276	36542	33756	22552	22665	19422	23497	25807	24531
A. Fuel combustion activities (sectoral approach)	**[including indirect CO2]**	**53084**	**53103**	**61028**	**53325**	**50643**	**49100**	**46292**	**34497**	**34563**	**31523**	**35353**	**37590**	**35784**
'1. Energy industries,	[including indirect CO2]	27472	27468	33696	26921	23887	24636	22420	13248	13803	11355	15102	17418	15991
'2. Manufacturing industries and construction		5517	5460	5921	6019	5543	4422	4345	3887	3674	3511	3812	3980	4190
'3. Transport		10733	10734	12093	12285	13242	13125	13030	12336	12258	12325	12195	12029	11493
'4. Other sectors		9190	9270	8995	7899	7592	6708	6258	4827	4888	4534	4288	4091	3934
'5. Other (Military)		170	170	323	201	379	209	239	199	223	220	220	220	221
B. Fugitive emissions from fuels		**516**	**516**	**699**	**1089**	**876**	**567**	**493**	**391**	**359**	**224**	**339**	**246**	**240**
GHGs (kt CO_2eq.)	**1. Total Energy**	**53600**	**53619**	**61727**	**54414**	**51519**	**49667**	**46785**	**34888**	**34922**	**31747**	**35691**	**37836**	**36024**
CO_2 (kt CO_2)		**52873**	**52894**	**60554**	**53023**	**50222**	**48545**	**45755**	**34134**	**34163**	**31052**	**34957**	**37132**	**35358**
CH_4 (kt CO_2eq.)		**364**	**364**	**730**	**907**	**851**	**692**	**624**	**365**	**375**	**327**	**344**	**315**	**281**
N_2O (kt CO_2eq.)		**362**	**361**	**443**	**484**	**445**	**431**	**406**	**389**	**384**	**368**	**391**	**389**	**385**
F-gases (kt CO_2eq.)		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GHGs (kt CO_2eq.)	1x. Total Enery (excluding Transport)	42866	42885	49634	42129	38276	36542	33756	22552	22665	19422	23497	25807	24531
CO_2 (kt CO_2)		42297	42317	48636	40900	37120	35552	32860	21943	22050	18876	22915	25259	24019
CH_4 (kt CO_2eq.)		308	308	673	861	818	673	605	354	365	320	337	308	274
N_2O (kt CO_2eq.)		262	260	326	369	338	317	291	255	249	226	244	240	238
F-gases (kt CO_2eq.)		0	0	0	0	0	0	0	0	0	0	0	0	0
GHGs (kt CO_2eq.)	1.A.3 Transport	10733	10734	12093	12285	13242	13125	13030	12336	12258	12325	12195	12029	11493
CO_2 (kt CO_2)		10577	10576	11918	12124	13102	12992	12895	12192	12113	12176	12042	11873	11339
CH_4 (kt CO_2eq.)		57	57	57	46	33	18	19	11	10	7	7	7	6
N_2O (kt CO_2eq.)		100	101	118	115	107	114	116	134	135	142	146	149	148
F-gases (kt CO_2eq.)		0	0	0	0	0	0	0	0	0	0	0	0	0

Note: For 2008-2012 and 2013-2020 the annual averages are shown.

FIGURE 5.9 PROJECTION OF GREENHOUSE GAS EMISSIONS IN KT OF CO_2 EQUIVALENTS FOR ENERGY INCLUDING TRANSPORT – AND EXCLUDING TRANSPORT , 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*,DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



5.1.2.4 Sensitivity analyses and scenario calculations

The projection cannot be better than the material on which it is based. It is no surprise that there is great uncertainty linked to the economic data, in particular in the more distant future. Similarly, on a number of occasions it has been demonstrated that tachygraphy data is also uncertain.

For the above reasons it is important to stress that the projection should only be used as a descriptive tool for developments from one period to another. The uncertainty of the values for the individual years may be great, and interpreting the level for the specific year may be incorrect.

As the projection results are sensitive to changes in key assumptions, sensitivity analyses have been carried out for the following parameters, which are considered to be particularly uncertain or of major importance to the results:

- Fuel prices
- CO_2 quota prices
- Developments in neighbouring countries
- Electricity consumption in Denmark
- The expansion with land wind and solar cells
- Weather variations - rainfall (in Norway and Sweden) and wind

Most of the calculations are based on two sets of alternative assumptions compared to the assumptions in the central scenario:

- A low emission development scenario based on high fuel and carbon prices, low biomass prices, high expansion rate with land wind and solar cells and good weather conditions for renewable energy production.
- A high emission development scenario based on low fuel and carbon prices, high biomass prices, low expansion rate with land wind and solar cells and bad weather conditions for renewable energy production.

As an example the CO_2 quota prices assumed in the low, central and high emission scenario from the sensitivity analyses are shown in Table 5.5. Detailed information on the actual assumptions for all parameters in the high emission and low emission scenarios is included in the background report (in Danish).

TABLE 5.5 CO_2 QUOTA PRICES ASSUMED IN THE CENTRAL EMISSION SCENARIO AND IN THE SENSITIVITY ANALYSES' LOW AND HIGH EMISSION SCENARIOS.

Source: *Denmark's Energy and Climate Outlook 2017 Background Report*, Danish Energy Agency, 2017 (in Danish)

CO_2 quota prices (2016) EUR/tonnes	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Low	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Central	**5.4**	**5.5**	**5.6**	**5.8**	**6.0**	**6.2**	**6.5**	**6.8**	**7.2**	**7.6**	**8.0**	**8.5**	**9.0**	**9.5**	**10.1**
High	9.2	10.8	12.3	13.8	15.3	16.9	18.4	19.9	21.5	23.0	25.3	27.5	29.8	32.0	34.3

In Figures 5.1, 5.2 and 5.3 the combined effects of the sensitivities analyzed on greenhouse gas emissions are shown as the colored areas expanding around the central scenario in the projection period.

In Figures 5.5, 5.6 and 5.7 the combined effects of the sensitivities analyzed on the energy parameters depicted are shown as the colored area expanding around the central scenario in the projection period.

5.1.3 Industrial Processes and Product Use

In addition to the emissions of greenhouse gases related to energy consumption by industry included in section 5.1.2, greenhouse gases are also emitted from a number of industrial processes. These include emissions from the production of cement, lime, bricks/tiles, glass etc., as well as emissions of the fluorine-containing industrial gases HFCs, PFCs and SF_6 (F-gases) from the production and use of products containing these substances, such as refrigerants, foaming agents, and insulation gases. The use of solvents and certain other products is a minor source of greenhouse gas emissions. The projections of these emissions are included here.

5.1.3.1 Methods

For process emissions, there is often proportionality between production and emissions, if there are no significant changes in the technology used in production or any measures to limit emissions. However, it is often not possible to obtain information from enterprises on their expected future production, partly for commercial reasons and partly because market and production conditions are unpredictable. The emission projections are therefore for some of the industrial sources based on projected production values for the energy and production industries from the Danish Energy Agency. These production value projections are available for steel-, glass- and cement-industry, building/construction and incineration of coal and waste for energy production.

For HFCs, PFCs and SF_6, also known as F-gases, emission projections are based on an F-gas projection published by the Danish Environmental Protection Agency (*Poulsen, 2017*). The fluorinated gases all contain fluorine, hence the name f-gases. None of the f-gases are produced in Denmark. The emission of these gases is therefore associated only with their use.

For the remaining sources, emission projections are based on historical emissions.

For more detailed information on the methodologies and sources used within the different categories is available in *Nielsen et al. (2017b).*

5.1.3.2 Assumptions and key parameters

With regard to process emissions, the projections are in general based on energy and production value projections related to specific sectors. From these value projections, extrapolation factors have been calculated and applied.

With regard to the fluorinated gases (F-gases) an account of the annual consumption and emission of F-gases has been prepared by a consultant on behalf of the Danish Environmental Protection Agency (DEPA) (*Poulsen, 2017*). In this connection, projections to 2030 have also been prepared. Annual reports that contain both consumption and emission data are available. In *Nielsen et al. (2017b)* this projection has been extended to 2035. The projections of the F-gas emissions are based on implemented and adopted policies and measures, described in Chapter 4, including a statutory order on the phasing out of certain industrial gases, including a ban on the use of HFC as a coolant in the retail trade and stationary A/C systems from 1 January

2007, except for refilling of existing systems, and as a foaming agent in PUR foam from 1 January 2006.

The assumptions and key parameters used within the different sub-sectors are described in detail in *Nielsen et al. (2017b)*.

5.1.3.3 Results

Results of projections of greenhouse gas emissions from industrial processes and product use, including emissions of F-gases, appear in Table 5.6 and Figure 5.10 together with the inventory data reported in April/May 2017.

TABLE 5.6 PROJECTIONS OF EMISSIONS FROM INDUSTRIAL PROCESSES AND PRODUCT USE IN KT OF CO_2 EQUIVALENTS, 1990-2015 ARE OBSERVED.

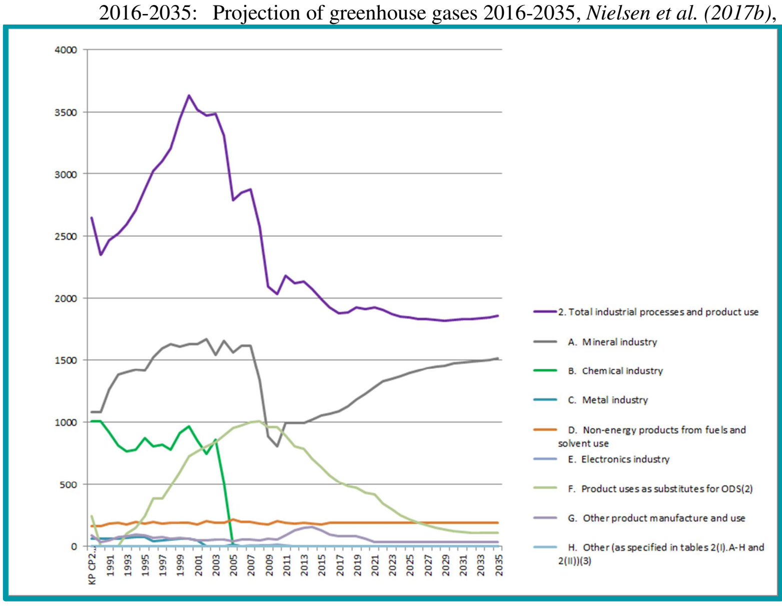
Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*,DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

GHG emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
2. Total industrial processes and product use	2644	2343	2878	3631	2789	2034	2199	1992	1964	1910	1844	1824	1857
A. Mineral industry	1080	1082	1418	1629	1563	804	1002	1052	1094	1227	1398	1473	1519
B. Chemical industry	1003	1003	870	966	1	1	1	2	1	1	1	1	1
C. Metal industry	65	60	73	61	16	0	0	0	0	0	0	0	0
D. Non-energy products from fuels and solvent use	165	165	185	190	215	203	185	173	186	187	187	187	187
E. Electronics industry	0	0	0	0	0	13	9	0	1	0	0	0	0
F. Product uses as substitutes for ODS	242	0	242	726	951	956	924	639	576	431	219	125	111
G. Other product manufacture and use	89	33	91	59	42	57	78	126	105	63	37	38	38
H. Other	0	0	0	0	0	0	0	0	0	0	0	0	0
GHGs (kt CO_2eq.)	2644	2343	2878	3631	2789	2034	2199	1992	1964	1910	1844	1824	1857
CO_2 (kt CO_2)	1276	1278	1642	1860	1795	1008	1188	1226	1281	1416	1587	1661	1707
CH_4 (kt CO_2eq.)	2	2	3	3	4	2	3	4	3	3	3	3	3
N_2O (kt CO_2eq.)	1021	1021	889	985	19	19	19	20	19	19	19	19	19
F-gases (kt CO_2eq.)	344	42	344	782	971	1005	990	742	661	472	235	141	127

Note: For 2008-2012 and 2013-2020 the annual averages are shown.

FIGURE 5.10 PROJECTIONS OF EMISSIONS FROM INDUSTRIAL PROCESSES AND SOLVENT AND OTHER PRODUCT USE IN KT OF CO_2 EQUIVALENTS, 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*,DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



5.1.3.4 *Sensitivity analyses and scenario calculations*

There are no sensitivity analyses and scenario calculations emissions of greenhouse gases from the industrial processes sector. On the basis of the effects described above, for example, it can be ascertained that the resumption of the production of nitric acid in Denmark – with the same technology as was used prior to the cessation in 2004, which in practice will probably not be the case – will increase annual emissions by about 1 million tonnes CO_2 equivalents. In other contexts it has also been assessed that a relaxation of Danish regulation regarding F gases to align with EU regulation would have increased Danish emissions of F gases by 0.4 – 0.7 million tonnes CO_2 equivalents per year in the period 2008-2012.

5.1.4 Agriculture

The emission of greenhouse gases from the agricultural sector includes the emission of methane (CH_4) and nitrous oxide (N_2O). Emissions are mainly related to livestock production and include CH_4 emissions from enteric fermentation and manure management and N_2O emissions from manure management and agricultural soils. Furthermore, minor CH_4 and N_2O emissions are estimated from the burning of straw on fields. The CO_2 emission from the agricultural sector covers emissions from liming, urea applied to soils and use of inorganic N fertiliser.

In this projection, the latest official reporting from Denmark includes emissions until 2015. Thus, the projection comprises an assessment of greenhouse gas emissions from the agricultural sector from 2016 to 2035.

It must be noted that CO_2 removals/emissions from agricultural soils are not included in the agricultural sector. According to the IPCC guidelines these removals/emissions should be included in the LULUCF sector (Land-Use, Land-Use Change and Forestry). The same comment applies to emissions related to agricultural machinery (tractors, harvesters and other non-road machinery); these emissions are included in the energy sector.

The most recent projected greenhouse gas emissions from the agricultural sectors (*Nielsen et al., 2017b*) are provided in Table 5.7 and Figure 5.11.

5.1.4.1 *Methods*

The projection of greenhouse gas emissions is regularly updated in line with new scientific knowledge, which also includes changes in the historical emission inventory. Therefore, some deviations are apparent in comparison with the projection scenarios published in previous reports. The projection of greenhouse gases published in *Nielsen et al. (2017b)* replaces the latest basic projection published in Scientific Report from DCE – Danish Centre for Environment and Energy No. 194, 2016 (*Nielsen et al., 2016*).

Regarding the environmental regulation for the agricultural production, it has until now primarily focused on the ammonia emission and nitrogen losses to the aquatic environment. Improvements of the nitrogen utilization and subsequent decrease in nitrogen losses will also reduce the greenhouse gas emissions. Biogas treated slurry has a direct influence on reducing the methane emission and following the Agreement on Green Growth (2009 and 2010), a strategy for expanding biogas production is agreed upon. The future biogas production is based on a forecast provided by the Danish Energy Agency.

The current projection takes into account the elements included in the Political Agreement on a Food and Agricultural package adopted in December 2015 (*MEFD, 2017*). The purpose of the agreement was to establish better framework conditions for the agricultural production, to ensure opportunities for economic growth, increased exports and increased employment, in interaction with nature and the environment. Expected change in the agricultural production conditions due to e.g. nitrogen use, biogas production, use of ammonia reducing technology in housing and etc., are included in the projection.

The methodology used to estimate the projected emission is based on the same methodology as used in the annual emission inventories, which is described in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (*IPCC, 2006*). Thus, the same database setup is used, as well as the same estimation approach and the same emission factors.

Increasing demands to reduce unwanted environmental effects of the livestock production has led to additional legislation regarding approvals and establishment of new animal houses with focus on ammonia reducing technologies. The current projection includes an increase in the uptake of ammonia reducing technologies, which has an indirect impact on N_2O emissions, as well as on CH_4 emissions. In the current projection, ammonia reducing technology includes acidification of slurry (housing, storage and application), cooling of manure in housing, air cleaning in housing, heat exchanger for poultry housing, manure removal in mink housing two times a week and slurry delivered to biogas plant.

The expectations to the future framework conditions for the agricultural production include establishment of ammonia-reducing technologies. Increasing demands to reduce unintended environmental effects of livestock production has led to more legislation in connection with approvals and establishment of new animal housing. This projection includes several objectives formulated in the Agreement on Green Growth (2009 and 2010), such as expansion of the biogas production and the establishment of non-cultivated areas along water streams and lakes. Furthermore implementation of technologies to achieve reductions in N-loss to the aquatic environment has been taken into account. The most important assumptions are expected change in number of produced animals, change in nitrogen excretion as a consequence of efficiency for dairy cattle and sows and expected changes in housing systems for livestock.

5.1.4.2 Assumptions and key parameters

The assumptions regarding the expansion and development of ammonia reducing technologies in livestock production are based on an assessment provided by the Danish Environmental Agency (DEPA, 2017), whose information is based on the environmental approvals register. The expectations to expansion of the biogas production are based on assumptions provided by the Danish Energy Agency (DEA).

The main part of the emissions is related to the livestock production, and thus the expectations to the development are a key element and have a substantial impact on the emission. The assumptions related to the expected development on the livestock production and the agricultural area are based on estimates provided by University of Copenhagen, Department of Food and Resource Economics by using the model called AGMEMOD (AGriculture MEmber states MODelling).

The AGMEMOD model is an econometric, dynamic, multi-product partial equilibrium model, which can be used to provide projections and simulations. The model follows the market for agricultural products such as cereals, potatoes, protein products, milk and meat and the flows between countries. The model does not represent a closed economy, but the concept of key markets and key prices has been introduced in order to take into account the influence of other member states on a given country market. Further information on the AGMEMOD model can be obtained from *Jensen et al., (2016b).*

For cattle, swine and broilers, the number of animals is based on the model AGMEMOD until 2030. For 2031-2035, the numbers have been assumed constant. For non-dairy cattle, the number of bulls and heifers are projected based on AGMEMOD combined with estimates from DCA (*Kristensen and Lund, 2016*), while the number of suckling cattle is based on an average for 2013-2015.

The projection of number of fur bearing animals (mink) is based on estimates made by Hansen (2016). Number of sheep, goats, hens, turkeys, ducks and geese is based on the average for 2013-2015 and the number of horses is kept at the same level as in 2015.

In 2015, approximately 3.8 million tonnes slurry were treated in biogas plants, which are equivalent to approximately 10 % of all slurry. Biogas treatment of slurry leads to a lower CH_4 emission from animal manure. Prognoses provided by DEA assume an increase of manure based biogas production from 5.3 PJ in 2015 to 13.8 PJ in 2020 and 16.0 PJ in 2023 (for total biogas production the figures are 6.3 PJ in 2015, 15.4 PJ in 2020 and 17.6 PJ in 2023) . The biogas production is maintained at the same level until 2035.

The projection of the agricultural area is based on the model AGMEMOD for 2020 to 2030. The years 2016-2019 are interpolated and 2031-2035 are set at the level as 2030. AGMEMOD assumes that the agricultural area decreases with 0.25 % per year, based on the development during the past 40 years. The production of different crops dependents on the development in prices and yields. The area with wheat and grass in rotation is assumed to increase in the years up to 2030, while the areas with barley, other cereals and permanent grass is assumed to decrease.

Projection of the area with organic soils is estimated for 2016-2035 (Gyldenkærne, 2016) and it is assumed that the area will decrease by 8 % during the period. In 2016 and 2017, funding is available for wetland restoration. These areas should at least have 70 % soils with an organic carbon (OC) content >12 %. For 2016 and 2017, it is expected that 1500 hectares of agricultural land is restored per year. From 2018 and onwards, there are no specific plans for wetland restoration. From 2018 and onwards, it is assumed that around 300 hectares organic soils is removed from agricultural land per year.

The projection on the use of inorganic N-fertiliser is based on Jensen et al. (2016), which estimates an economic optimum norm for use of inorganic N-fertiliser. However, estimates from Knudsen (2017) and Olesen (2017) shows that the optimum norm is not fully used, and therefore the use of inorganic N-fertilisers is around 7 % lower than the economic optimum. This is taken into account in the projection.

More details on the assumptions regarding developments in livestock, technology, agricultural area, use of synthetic fertiliser, nitrogen leaching and field burning of agricultural residues are given in *Nielsen et al. (2017b).*

5.1.4.3 *Results*

The results of the March 2017 baseline projection scenario regarding greenhouse gas emissions from agriculture are provided in Table 5.7 and Figure 5.11. The greenhouse gas emission is expected to increase from 10.3 million tonnes CO_2 equivalents in 2015 to 10.6 million tonnes CO_2 equivalents in 2020 and 10.7 million tonnes CO_2 equivalents in 2035. Thus, a 4 % increase of GHG emission from the agricultural sector from 2015 to 2035 is expected. The increased emission is driven both by an increase in CH_4 emission and N_2O emission.

As it can be seen from Table 5.7, the greenhouse gas emissions from enteric fermentation and manure management taken together (primarily CH_4 emissions) are nearly unchanged from 2015 to 2035. The decreased emission from manure management compensates for an increase in emission from enteric fermentation. The historical emission related to the enteric fermentation shows a decrease, which is due to a fixed EU milk quota. Because of higher milk yield per cow, a lower number of dairy cattle are needed to produce the amount of milk, corresponding to the EU milk quota. The AGMEMOD model indicates that Denmark, in the future, can be expected to increase both the milk production and the number of dairy cattle. A growing number of dairy cattle, a continued continued increase in milk yield, followed by an increase of feed intake, all leads to an increase of the CH_4 emission from enteric fermentation.The CH_4 emission from manure management has increased from 1990 to 2015, which is a result of change in housing systems towards more slurry based systems. In the future, the emission from manure management is expected to decrease due to more housing systems with acidification of manure and manure cooling, and because of more manure delivered to biogas production.

The expected development for the greenhouse gas emissions from agricultural soils (primarily N_2O emissions) is an increase of 5% from 2015 to 2035. This increase is mainly driven by an increase in emissions from animal manure applied on soil and an increase in the use of inorganic N fertilisers.

TABLE 5.7. PROJECTED TOTAL GREENHOUSE GAS EMISSION FROM DIFFERENT ACTIVITIES IN THE AGRICULTURAL SECTOR IN KT OF CO_2 EQUIVALENTS. 1990-2015 ARE OBSERVED.

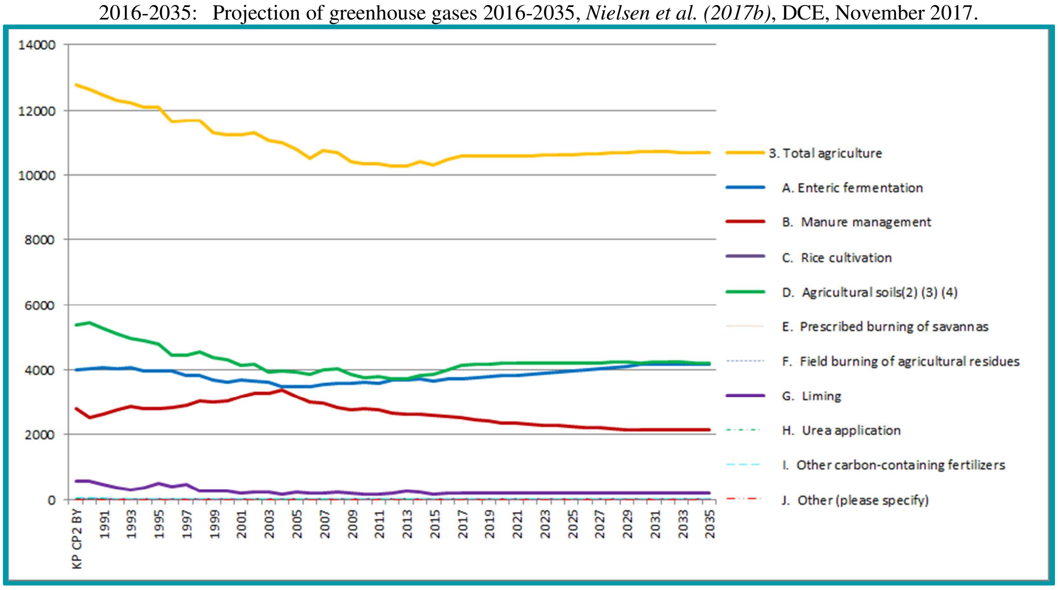
Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*,DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

GHG emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
3. Total agriculture	12784	12631	12079	11228	10788	10326	10406	10299	10469	10572	10629	10702	10696
A. Enteric fermentation	4011	4039	3967	3631	3483	3631	3618	3667	3732	3814	3971	4153	4153
B. Manure management	2789	2522	2796	3034	3165	2793	2762	2586	2515	2358	2246	2133	2131
C. Rice cultivation	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Agricultural soils	5362	5448	4775	4290	3913	3743	3836	3864	4009	4196	4213	4219	4216
E. Prescribed burning of savannas	0	0	0	0	0	0	0	0	0	0	0	0	0
F. Field burning of agricultural residues	3	3	3	4	5	3	4	4	4	4	4	4	4
G. Liming	565	565	496	261	220	153	183	166	204	195	191	188	188
H. Urea application	15	15	15	2	0	1	1	1	1	1	1	1	1
I. Other carbon-containing fertilizers	38	38	26	5	2	3	3	10	4	4	4	4	4
J. Other	0	0	0	0	0	0	0	0	0	0	0	0	0
GHGs (kt CO_2eq.)	12784	12631	12079	11228	10788	10326	10406	10299	10469	10572	10629	10702	10696
CO_2 (kt CO_2)	619	619	537	268	222	156	186	177	209	200	196	193	193
CH_4 (kt CO_2eq.)	5824	5585	5831	5719	5682	5633	5588	5524	5550	5534	5590	5669	5669
N_2O (kt CO_2eq.)	6342	6427	5712	5241	4884	4537	4631	4597	4710	4838	4843	4840	4834
F-gases (kt CO_2eq.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: For 2008-2012 and 2013-2020 the annual averages are shown.

FIGURE 5.11. PROJECTED TOTAL GREENHOUSE GAS EMISSION FROM DIFFERENT ACTIVITIES IN THE AGRICULTURAL SECTOR IN KT OF CO_2 EQUIVALENTS. 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



5.1.4.4 Sensitivity analyses and scenario calculations

In general the projection is uncertain and the result is sensitive to the assumptions and parameters. Therefor a sensitivity analysis is carried out. In this analysis the paremeter investigated is the number of dairy cattle. Dairy cattle have a relatively significant impact on the development of emissions from Danish agriculture, and there is also great uncertainty about the expected development. The European milk market is finding a new equilibrium after the abolition of EU milk quotas, and very small adjustments in assumptions about cross-border pricing are important for where in the EU the future milk will be produced. In the underlying projection of agricultural activities there is an expectation of a moderate increase in the number of dairy cattle by 2030. In the projection, a confidence interval was valued at +/- 17 per cent. in 2030. A sensitivity analysis has therefore been made on the emissions in a situation where the number of animals in 2030 is 17 pct. higher respectively lower than the central estimate of the projection. The numbers of animals are taken from agricultural projections made by the Department of Food and Resource Economics (IFRO), and the emissions are calculated on the basis of emission factors per animal from DCE. The results are shown in Table 5.8.

TABLE 5.8. VARIATION IN GREENHOUSE GAS EMISSIONS DUE TO VARIATION IN PROJECTED NUMBER OF DAIRY CATTLE IN KT OF CO_2 EQUIVALENTS.

Source: *Denmark's Energy and Climate Outlook 2017 Background Report*, Danish Energy Agency, 2017 (in Danish)

	2015	2020	2025	2030
Number of dairy cows, central estimate	570,000	578,000	592,000	612,000
Sensitivity, +/- number of animals	-	80,000	90,000	103,000
Sensitivity, +/- kt CO_2 equivalents	-	400	400	500

5.1.5 LULUCF

The emission of GHGs from the LULUCF sector (Land Use, Land Use Change and Forestry) primarily includes the emission of CO_2 from land use, small amounts of N_2O from disturbance of soils not included in the agricultural sector and CH_4 emission from Grassland, Wetlands and wild fires in the LULUCF sector.

The LULUCF sector is subdivided into six major categories:

- Forest (FL),
- Cropland (CL),
- Grassland (GL),
- Wetlands (WE) subdivided into fully water covered and partly water covered,
- Settlements (SE) and
- Other Land (OL).

The projections are made on best available knowledge on the past development in the land use in Denmark and expectations for the future. The methodologies for estimation of emissions by sources and removals by sinks for the different sectors Forest, Cropland, Grassland, Wetlands, Settlements and Other Land, are described in greater detail in Chapter 7 of *Nielsen et al.* (2017a, DCE, *Denmark's National Inventory Report 2017*). Furthermore, the 2006 IPCC Guidelines (IPCC 2006) and the 2013 Wetlands Supplement (IPCC 2014) have been taken into account.

Approximately two thirds of the total Danish land area is cultivated and 14.3 per cent is forest, see Figure 5.12. Intensive cultivation and large numbers of animals exert high pressure on the landscape, and regulations have been adopted to reduce this pressure. The adopted policy aims at doubling the forested area within the next 80-100 years, restoration of former wetlands,etc.. In Denmark almost all natural habitats and all forests are protected. Therefore, only limited conversions from forest or wetlands into cropland or grassland have occurred and is expected to occur in the future.

Figure 5.12 shows the land use in 1990, 2010 and the expected land use in 2035. A continuous increase in Forest land and Settlements is expected, at the expense of primarily the Cropland area. It should be noted that the definition of the LULUCF-sectors differs slightly from the normal Danish land use definitions and the shown distribution will therefore differ from other national statistics.

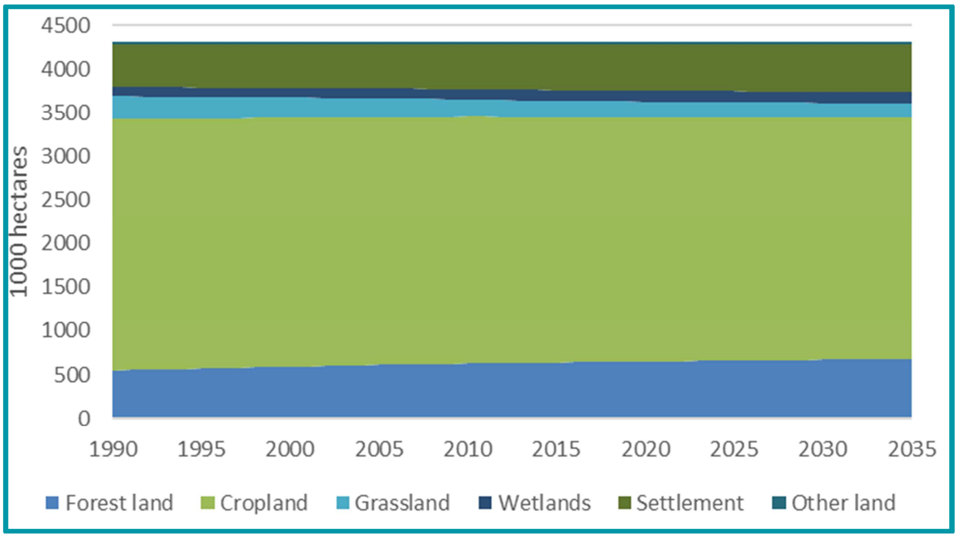
Land use conversions (LUC) affect whether a category is a sink or a source. In the following, emissions by sources are given as positive values (+) and removals by sinks are given as negative values (-).

The figures reported below are under the Convention. This implies that an area, which has undergone LUC, is kept in the corresponding land use change category for 20 years. After this period, the area is moved to land remaining land.

Under the Kyoto Protocol, Denmark has elected Cropland Management (CM) and Grazing Land Management (GM) under article 3.4 in addition to the obligatory Afforestation, Reforestation and Deforestation (ARD) under article 3.3 and Forest Management (FM) under article 3.4. Since land, which is converted from one category to another (e.g. from Cropland to Settlements), cannot be omitted from the reporting obligation under the Kyoto Protocol, the actual estimates in each category reported under the Convention, may not be the same as accounted under the Kyoto Protocol, see Section 5.1.5.5.

FIGURE 5.12 LAND AREA USE 1990-2035.

Source: *Nielsen et al. (2017b)*



5.1.5.1 Methods

Other methodologies are applied when projecting emissions by sources and removals by sinks for the categories Forest, Cropland, Grassland, Wetlands, Settlements and Other Land. In general the methodologies used in the projections follow the methodologies used for the estimations of the historic greenhouse gas inventories for these categories. Further details about the methodologies used are available in *Nielsen et al. (2013)*.

5.1.5.2 Assumptions and key parameters

For the categories Forest, Cropland, Grassland, Wetlands, Settlements and Other Land also different assumptions and key parameters are used.

For example for Forest, one of the main assumptions is that the Danish forest policy target of doubling the forest area from 1980 to 2080 will be maintained.

For Cropland, the decrease over the last 20 years, primarily due to urbanisation and afforestation, is assumed to continue in the future.

Further details about the assumptions and key parameters for the different categories are available in *Nielsen et al. (2013)*.

5.1.5.3 Results

The overall expected emission trends in the LULUCF sector are shown in Table 5.9 and Figure 5.13. For these categories an overall emission of around 4,153 kt CO_2 equivalents per year in 2015 is estimated, decreasing to 1,038 kt CO_2 equivalents per year in 2035.

TABLE 5.9 PROJECTIONS OF GREENHOUSE GAS EMISSIONS FROM THE LULUCF SECTOR* IN KT OF CO_2 EQUIVALENTS, 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.

2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

GHG emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
4. Total LULUCF (land use, land-use change and forestry)	9	4902	4190	4208	5240	-797	-635	4153	2431	2366	1864	2014	1038
A. Forest land		-553	-557	-580	536	-3768	-4346	229	-1039	-351	-972	-970	-2152
B. Cropland		4412	3912	3825	3540	2008	2672	2601	2247	1545	1661	1841	2053
C. Grassland		931	856	819	878	855	925	1363	1183	1107	1101	1101	1101
D. Wetlands		102	75	76	117	91	90	55	65	76	82	49	49
E. Settlements		13	19	25	47	60	66	71	75	82	90	99	108
F. Other land		0	0	0	0	0	0	0	0	0	0	0	0
G. Harvested wood products		-2	-116	26	98	-72	-70	-171	-100	-93	-97	-107	-121
H. Other		0	0	0	0	0	0	0	0	0	0	0	0
GHGs (kt CO_2eq.)	9	4902	4190	4208	5240	-797	-635	4153	2431	2366	1864	2014	1038
CO_2 (kt CO_2)	9	4856	4136	4146	5169	-876	-714	4059	2339	2270	1767	1915	938
CH_4 (kt CO_2eq.)		19	27	35	44	51	53	60	62	66	66	66	66
N_2O (kt CO_2eq.)		27	27	27	27	27	27	34	30	30	31	32	34
F-gases (kt CO_2eq.)		0	0	0	0	0	0	0	0	0	0	0	0

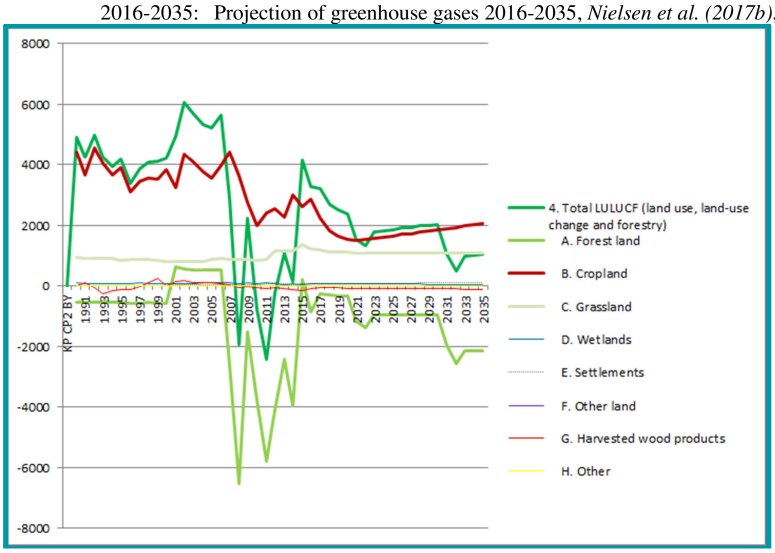
Notes: For 2008-2012 and 2013-2020 the annual averages are shown. Emissions by sources are given as positive values (+) and removals by sinks are given as negative values (-). *Under the Kyoto Protocol, separate rules regarding the LULUCF sector apply in accordance with articles 3.3 and 3.4 of the protocol.

The Danish forests are expected to be a steady sink in the coming years, which is primarily due to the expectations of an increase of forest area with the related increase in Carbon (C) stock.

In total from 1990 to 2035, an afforestation of 136 774 hectares is expected, while the deforestation is only expected to include 18 059 hectares. Half of the deforestation area is conversion of Christmas trees in agricultural rotation back to CL. These areas have a limited amount of C stock. The other half of the deforestation area is due to conversion to SE and new roads, or more open areas in the forests. FL remaining FL is expected to be a small sink in the near future.

FIGURE 5.13 PROJECTIONS OF GREENHOUSE GAS EMISSIONS FROM THE LULUCF SECTOR* IN KT CO_2 EQUIVALENTS, 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



*Under the Kyoto Protocol, separate rules regarding the LULUCF sector apply in accordance with articles 3.3 and 3.4 of the protocol.

CL and GL are major sources, primarily due to the large area with cultivated organic soil in Denmark. The steady extensification of the CL area on organic soil towards permanent GL and the conversion to WE, leads to a decrease in emission until 2035. Currently the agricultural mineral soils are near a C balance, but in the future the C stock in mineral agricultural soils is expected to increase, as a general increase in the harvest yield of 5 % is expected, as the Danish farmers are allowed to increase the fertilization rate from 2016 and onwards. As CL is dominated by large emissions from organic soils, the increased C stock in mineral soils will give a reduction in the overall emission from CL.

The area reported under GL is assumed stable with only minor changes.

For WE, only emissions from managed WE are reported. The overall trend for WE is a decreasing emission from WE remaining WE, caused by a decreasing peat excavation in Denmark. Peat excavation is expected to cease completely by 2029.

SE is expected to have increasing emissions, because of the steady LUC to SE and especially from CL. The increasing emissions are caused by a loss of Soil Organic Carbon (SOC), because the default C stock in SE is lower than for the land, from which it is converted.

Harvested Wood Products is estimated to be a small sink due to an increased logging in the Danish forests.

5.1.5.4 Sensitivity analyses and scenario calculations

Sensitivity analyses have not been carried out for the greenhouse gas projections in the LULUCF sector. As reseach with a view to improve estimates of emissions an removals in the LULUCF sector is carried out on a continuously basis, new knowledge, as well as correction of errors, could lead to changes in future LULUCF inventories and projections as has been the case in the past (see Box 5.1).

5.1.5.5 Projection of accounting quantities under Articles 3.3 and 3.4 of the Kyoto Protocol

In addition to the obligatory inclusion of ARD (article 3.3), and in the second commitment period FM, Denmark has elected CM and GM under article 3.4 to meet its reduction commitment in the first commitment period of the Kyoto Protocol 2008-2012. With the election of CM and GM in the first commitment period, the inventories and accounting is mandatory in the second commitment period although Denmark cannot use LULUCF credits in the achievement of Denmark's annual reduction targets for the non-ETS sectors under the EU Effort Sharing Decision for the period 2013-2020. Although, the accounting under the Kyoto Protocol is based on the national inventory under Climate Convention (UNFCCC) there are several differences. The major differences are CM and GM, where the reduction is estimated based on the net-net principle. Furthermore, a land area, which belongs to any of the elected land use activities in 1990 cannot leave the commitment, and must therefore be accounted for in the future. It means that land converted from CL to e.g. SE must still be accounted for in the first and all subsequent commitment periods.

In Table 5.10, the projected emissions from ARD, FM, CM and GM until 2020 are shown. As land cannot leave an elected activity, these figures area slightly different from those given in Table 5.9 for CL and GL. The main driver for the decreased emission is the expected increase in C stock in mineral soils and conversion of organic CL and GL to WE. In the projection, afforestation will be a net sink of approximately 720 kt CO_2 eqv per year until 2020 and deforestation would be a source of 84 kt CO_2 eqv per year until 2020. FM will be a net source of around 300 kt CO_2 eqv per year until 2020.

The related projected accounting quantities are shown in Table 5.11. For CM, the expected increase in crop yield due to the increased N allocation to CL, leads to an increase of the C stock in the soil in the near future. GM is estimated to contribute negatively with emissions in the period compared to 1990. From the historic inventories for 2013-2015 and the projected estimates for 2016-2020 the annual average of accounting quantity for the period 2013-2020 is estimated at 3,293 kt CO_2 eqv. or 3.293.000 so-called RMU credits.

TABLE 5.10 PROJECTED EMISSION ESTIMATES FOR ARTICLES 3.3 AND 3.4 ACTIVITIES IN KT CO_2 EQUIVALENTS. 1990-2015 ARE OBSERVED.

Source: 1990, 2013-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2020: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

kt CO_2 equivalents*	1990	2013	2014	2015	2016	2017	2018	2019	2020
Afforestation/Reforestation (3.3/AR)	-30.4	23.0	-326.8	-607.6	-774.4	-720.5	-719.6	-718.3	-717.0
Deforestation (3.3/D)	10.3	35.8	116.4	252.8	162.1	162.8	84.2	84.4	84.5
Forest Management (3.4/FM)	-498.3	-2546.2	-3774.1	667.7	-151.8	377.2	345.6	328.4	297.0
Cropland Management (3.4/CM)	4416.2	2297.5	3003.9	2542.3	2855.9	2252.2	1821.5	1660.4	1558.3
Grassland Management (3.4/GM)	932.0	1181.6	1091.3	1283.6	1142.3	1105.1	1101.9	1096.7	1091.4

* Emissions by sources are given as positive values (+) and removals by sinks are given as negative values (-).

TABLE 5.11 PROJECTED ACCOUNTING QUANTITIES 2013-2020 FOR AFFORESTATION (A), REFORESTATION (R), DEFORESTATION (D) UNDER ART. 3.3. AND FOREST MANAGEMENT (FM), CROPLAND MANAGEMENT (CM) AND GRASSLAND MANAGEMENT (GM) UNDER ART. 3.4 OF THE KYOTO-PROTOCOL IN KT CO_2 EQUIVALENTS OR CREDITS IN '000 REMOVAL UNITS. 2013-2015 ARE OBSERVED.

Source: 2013-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2020: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

'000 RMU credits*	2013	2014	2015	2016	2017	2018	2019	2020	Total for the period 2013-2020	Annual average for the period 2013-2020
3.3: AR	23	-327	-608	-774	-721	-720	-718	-717	-4,561	-570
3:3: D	36	116	253	162	163	84	84	85	983	123
3.3: Total	**59**	**-210**	**-355**	**-612**	**-558**	**-635**	**-634**	**-633**	**-3,578**	**-447**
FMRL(original)#	409	409	409	409	409	409	409	409	3,272	409
FMRL(tech. corr.)#	-83	-83	-83	-83	-83	-83	-83	-83	-661	-83
FMRL(corrected)#	326	326	326	326	326	326	326	326	2,611	326
3.4: FM#	-2,873	-4,101	341	-478	51	19	2	-29	-7,067	-883
3.4: CM	-2,119	-1,412	-1,874	-1,560	-2,164	-2,595	-2,756	-2,858	-17,338	-2,167
3.4: GM	250	159	352	210	173	170	165	159	1,638	205
3.4: Total	**-4,742**	**-5,353**	**-1,181**	**-1,828**	**-1,940**	**-2,406**	**-2,589**	**-2,728**	**-22,767**	**-2,846**
3.3 and 3.4: Total	**-4,683**	**-5,564**	**-1,536**	**-2,440**	**-2,498**	**-3,041**	**-3,223**	**-3,360**	**-26,345**	**-3,293**

* Emissions by sources and debits are given as positive values (+) and removals by sinks and credits are given as negative values (-).
# Only changes in net emissions from FM activites beyond the Forest Management Reference Level (FMRL) established for the second commitment period (2013-2020) including the technical correction reported in Denmark's initial report under the Kyoto Protocol's second commitment period. In accordance with the review of Denmark's initial report a FMRL(corrected) of 326 kt CO_2 per year in the period 2013-2020 has been used to calculate the FM accounting quantities shown in the table.

5.1.6 Waste

Greenhouse gas emissions under this sector include methane (CH_4) from landfills and methane and nitrous oxide (N_2O) from wastewater treatment. In the historic greenhouse gas inventories, minor sources are included, e.g. human cremation, animal cremation, sludge spreading, biogas production, other combustion, accidental building fires, accidental vehicle fires and compost production. For completeness these sources are included in the projections also. Further information on the projection of emissions from these minor sources is available in *Nielsen et al. (2017b).*

5.1.6.1 Methods

Landfills

The CRF source category 5.A, "Solid waste disposal", gives rise to CH_4 emissions.

The CH_4 emission is calculated by means of a First Order Decay (FOD) model equivalent to the IPCC Tier 2 methodology (*Nielsen et al., 2016*). The model calculations are performed using national statistics on landfill waste categories reported in the national waste statistics. Waste amount reported according to the European waste codes are grouped into 18 waste types with individual content of degradable organic matter and degradation kinetics expressed as half-lifes (*Nielsen et al., 2016*).

Biological Treatment of Solid Waste

Biological treatment of solid waste consists of the sub-categories Composting and Anaerobic digestion of organic waste (biogas production).

Emissions from composting are calculated according to a country specific Tier 1 method. In Denmark, composting of solid biological waste includes composting of garden and park waste (GPW), organic waste from households and other sources, sludge and home composting of garden and vegetable food waste. The future activity of each category has been projected individually while the emission factors are kept constant throughout the time series.

Biogas production in this sector covers emissions from the handling of biological waste including biowaste and manure digested at manure-based biogas plants. The energy production at biogas plants within the agricultural sector is projected by the Danish Energy Agency to increase from 7.8 PJ in 2016 to a constant level of 16 PJ 2023 to 2035. The methane emission is calculated using an emission factor of 4.2 % of the methane content in the produced biogas.

Waste Incineration

Most waste incineration in Denmark – such as incineration of municipal, industrial, clinical and hazardous waste – takes place with energy recovery. In accordance with the IPCC guidelines for greenhouse gas inventories the major part of emissions from waste incineration is included under the Energy sector.

However, other incineration activites such as cremation of human bodies and cremation of animal carcasses also contribute with CH_4 emissions.

Flaring off-shore and in refineries are also included under the Energy sector. No flaring in chemical industry occurs in Denmark.

Wastewater handling

Methane emissions from the municipal and private wastewater treatment plants (WWTP) are divided into contributions from 1) the sewer system, primarily settling tanks and biological N and P removal processes, 2) an-aerobic treatment processes in closed systems with biogas extraction and combustion for energy production and 3) septic tanks. For a detailed description of the model equations and input parameters (process-specific emissions factors and activity data), see *Nielsen et al., (2016)* and *Thomsen (2016).*

Other

As the historic greenhouse gas inventories include emissions from accidental building and vehicle fires under the waste sub-category "Other", contributions from these minor sources are also included in the projections. Projected activity data for accidental building fires and vehicle fires are chosen as the average of 2010-2014 data.

5.1.6.2 Assumptions and key parameters

Landfills

The total amount of waste deposited at landfills are fluctuating, while a continuous decrease in the amount of organic degradable waste reaching a constant level in the period 2005 to 2015 as shown in Table 5.12. The high value for total waste in 2010-2012 is caused by changes to the data system and registration of more inert waste than in preceding or following years.

The Danish EPA projects the total amount of primary waste to increase to 13400 kt in 2030. Of this amount 4.4 %, i.e. 590 kt, is deposited at landfills. The projected waste amounts are excluding sludge and stones (DEPA, 2015).

In the present projection of methane emissions from SWDSs, the characteris-tics of waste type distributions have been set constant throughout the projection period 2016-2035. All waste types are kept constant from 2030 to 2035. For soil and stone, as well as sludge, the amounts are kept at a constant level from 2016 to 2035 corresponding to the average value of the last five years. The waste type soil and stone does not influence the modelled methane emissions as soil and stone are characterized as an inert waste fraction in the FOD model (*Nielsen et al. (2016)*).

The amount of recovered methane was estimated based on information from the Danish Energy Agency stating that the amount of recovered methane will reach a constant level of 0.14 PJ per year from 2018 onwards.

The reason for the sharp decrease in historical data on deposited amounts of organic waste in the period 1990-2009, is to be found in a combination of the Danish waste strategies and action plans including goals for a continued minimising the amount of deposited waste in favour of an increased reuse and combustion for energy production. Even though the percentage of waste being deposited at landfills is decreasing to 4.4 % in 2030, the total amount of waste is increasing from 10 600 kt in 2012 to 13 400 kt in 2030 (DEPA, 2015), which causes the absolute amount of waste being deposited at landfills to increase slightly.

It should be mentioned that the preliminary estimates of the impact of implementing the measure "Biocover" (measure no. WA-9 in Chapter 4) is included in the baseline projection published by the Danish Energy Agency in March 2017, and therefore also in the projection presented here. However, this impact is not included in the projection report published by DCE in November 2017. The difference is shown in Annex C1.

TABLE 5.12 HISTORICAL AND PROJECTED AMOUNTS OF DEPOSITED WASTE AT DANISH LANDFILL SITES: TOTAL AND ORGANIC AMOUNTS OF WASTE, ACCUMULATED DECOMPOSABLE ORGANIC WASTE, ANNUAL DEPOSITED METHANE POTENTIAL, GROSS EMISSION, RECOVERED METHANE, NET METHANE EMISSION AT DANISH LANDFILL SITES, KT.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2035
Total Deposited Waste	3190	1969	1489	983	2463	2587	2475	1417	1278	1084	1760	1828	1896	1896
Total deposited organic waste	1128	776	601	147	173	247	239	221	228	229	276	316	355	355
Accumulated amount of decomposable organic matter	2063	2063	2009	1681	1395	1349	1303	1258	1215	1175	1007	881	787	714
Annual amount of degraded organic matter	93	92	86	73	59	56	54	52	50	48	40	34	29	26
Annual deposited CH_4, potential	88	60	59	6	3	5	8	6	5	5	7	8	8	9
Annual Gross CH_4 emission	69	67	59	50	40	38	37	35	34	32	27	23	20	18
Recovered methane	1	8	11	10	6	4	4	4	3	3	3	3	3	3
Annual net emission after oxidation	61	53	43	36	31	31	30	28	28	26	22	18	15	13
Implied Emission Factor [kt/kt]	0.019	0.027	0.029	0.037	0.013	0.012	0.012	0.02	0.022	0.024	0.012	0.01	0.008	0.007

Wastewater

The fugitive methane emissions from the sewer system, primary (and secondary) settler tanks (clarifiers) and aerobic biological treatment processes are estimated from the amount of influent total organic degradable matter measured as the chemical oxygen demand (COD) in the influent wastewater flow.

Net methane emissions from anaerobic digestion in biogas tanks are at present estimated with a emission factor set to 1.3 % representing the losses in relation to the methane content in the gross energy production from biogas plants reported by the Danish Energy Agency. The methane content in the biogas is calculated from the calorific value 23 GJ/1000 m^3 biogas provided by the Danish Energy Agency, a percent volume content of methane of 65 % and a density of 0.68 kg CH_4/Nm^3.

Methane emissions from septic tanks are calculated from an emission factor (EFst) of 0.125 kg CH_4 per kg COD, the fraction of the population not connected to the collective sewer system (10 % for the entire time series estimated from National statistics of scattered houses in percent of the total number of households in Denmark from *Nielsen et al., (2015)*) and the default IPCC value of the per capita produced degradable organic matter, DOCst, i.e. 22.63 kg BOD per person corresponding to 56.6 kg COD per person (*IPCC, 2006*).

Nitrous oxide emissions from wastewater treatment processes include both direct and indirect N_2O emission. These emissions are calculated based on country-specific and process specific emission factors (*Nielsen et al. (2016)*) and the amount of nitrogen in the influent and effluent wastewater, respectively. The N content in influent and effluent wastewater was projected based on the influent N per person per year in 2015 and projected according to population statistics, while the effluents from separate industries, rainwater conditioned effluents, scattered houses and aquaculture was held constant at the 2015 level form 2016-2035. For the total N in the effluents, the contribution from separate industries, rainwater conditioned effluents, scattered settlements and aquaculture, a decreasing trend followed by a close to constant level is observed and the 2015 effluent level are kept constant throughout the projection period. The total N content in the influent and effluent from WWTPs is increasing according to population statistics for the period 2016-2035.

5.1.6.3 Results

The projection of methane emissions from landfills and methane, and nitrous gas emissions from wastewater handling is shown as total greenhouse gas emissions in Table 5.13 and Figure 5.14.

TABLE 5.13 PROJECTIONS OF GREENHOUSE GAS EMISSIONS FROM LANDFILLS AND WASTEWATER HANDLING IN KT OF CO_2 EQUIVALENTS, 1990-2015 ARE OBSERVED.

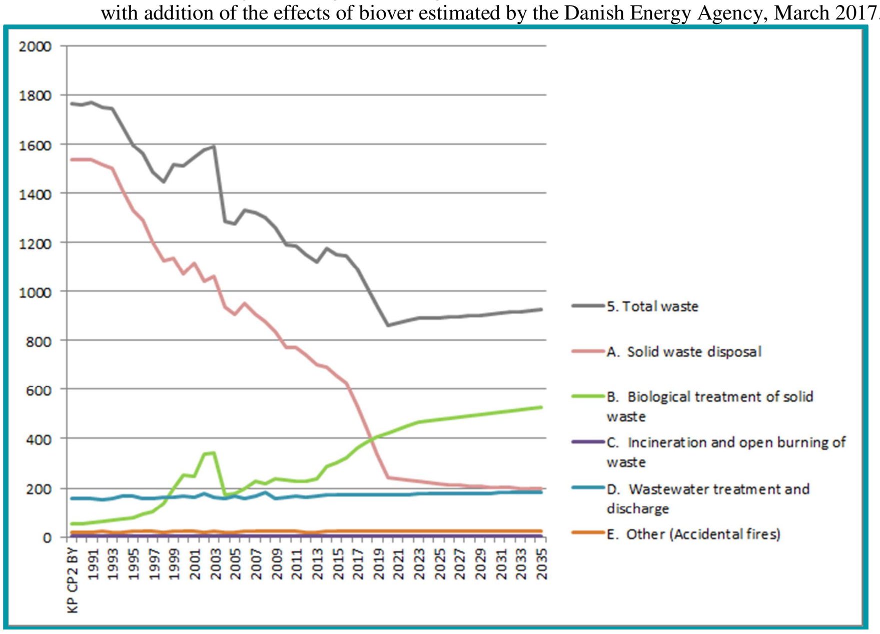
Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.

GHG emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
5. Total waste	1765	1763	1598	1513	1276	1190	1218	1153	1063	861	894	908	926
A. Solid waste disposal	1536	1536	1331	1073	909	772	800	655	528	241	218	205	196
B. Biological treatment of solid waste	52	50	78	254	177	234	229	301	341	425	478	502	526
C. Incineration and open burning of waste	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Wastewater treatment and discharge	157	157	167	166	169	163	167	172	172	174	177	180	182
E. Other (Accidental fires)	19	19	22	20	20	20	21	24	21	21	21	21	21
GHGs (kt CO_2eq.)	1765	1763	1598	1513	1276	1190	1218	1153	1063	861	894	908	926
CO_2 (kt CO_2)	18	18	20	18	18	18	19	21	19	19	19	19	19
CH_4 (kt CO_2eq.)	1674	1672	1489	1278	1134	1021	1046	955	867	653	669	664	664
N_2O (kt CO_2eq.)	74	74	90	217	124	151	153	176	177	189	207	225	243
F-gases (kt CO_2eq.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: For 2008-2012 and 2013-2020 the annual averages are shown.

FIGURE 5.14 PROJECTIONS OF GREENHOUSE GAS EMISSIONS FROM LANDFILLS AND WASTEWATER HANDLING IN KT OF CO_2 EQUIVALENTS, 1990-2011 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.



5.1.6.4 *Sensitivity analyses and scenario calculations*

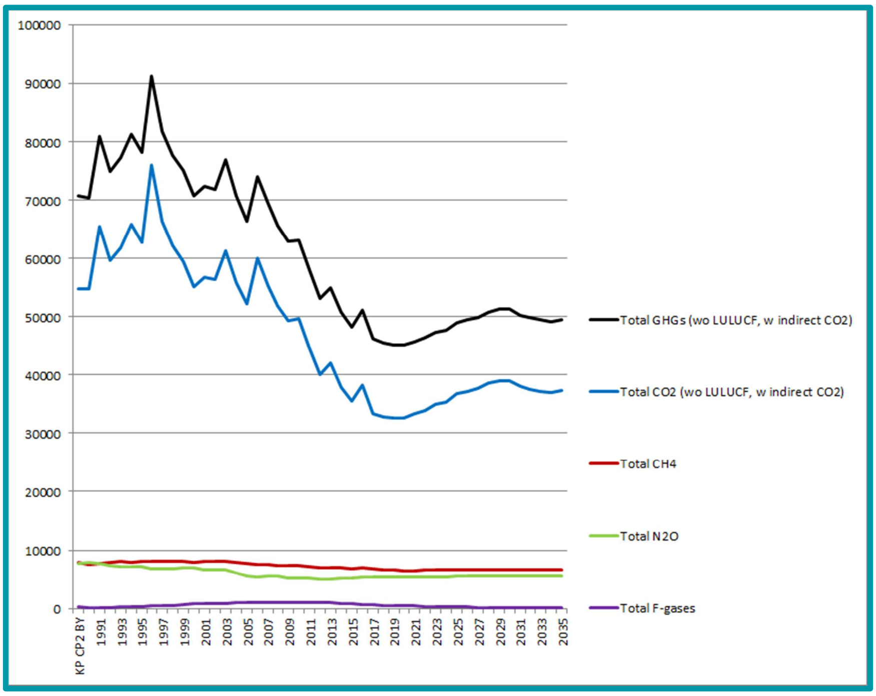
Sensitivity analyses have not been carried out for the waste sector. But as an example, the methan emissions from abandoned landfills would be 300 kt CO_2- eq. higher in 2020 and 179 kt CO_2- eq. higher in 2030 if the biocover measure (WA-9) will not have the projected effect (cf. the effects shown on the first page of Annex C1).

5.1.7 Projection results by gas

In this section information on the WEM projection results on a gas by gas basis is given. Total emissions by gas are shown in Figure 5.15.

FIGURE 5.15 PROJECTIONS OF GREENHOUSE GAS EMISSIONS IN DENMARK IN KT OF CO_2 EQUIVALENTS, TOTAL EXCLUDING LULUCF AND FOR THE DIFFERENT GREENHOUSE GASES (THE F-GASES ARE SHOWN AS A GROUP). 1990-2015 ARE OBSERVED.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.



5.1.7.1 *Carbon dioxide, CO_2*

Table 5.14 and Figure 5.16 shows the expected development in CO_2 emissions in Denmark’s main IPCC sector categories. A more detailed projection in IPCC source and sector categories is contained in Annex C1.

The total CO_2 emission with indirect CO_2 emissions and without land-use, land-use change and forestry (LULUCF) was 54,808 kt in 1990 and 35,339 kt in 2015. In comparison, for the period 2013-2020, it has been calculated that the average annual CO_2 emissions will be 35,672 kt CO_2.

The biggest source of CO_2 emissions in Denmark is combustion of fossil fuels, including electricity and heat production and transport.

Emissions of CO_2 from electricity production have varied considerably in the period 1990-2015 due to great variations in exports/imports of electricity.

The transport sector has had the biggest increase in CO_2 emissions since 1990, and the emissions are expected to continue rising for the whole of the projection period. CO_2 emissions from the transport sector were 10,576 kt of CO_2 in 1990 and had risen to a peak of 14,217 kt of CO_2 in 2007, and therafter decreased to 12,192 kt of CO_2 in 2015. From 2016 the projection shows a slight decrease in the projection period until 2035.

The total net emissions in the Land-Use Categories (LULUCF) sector have fluctuated in historic data due to inter-annual variations in the harvest both in Forest Land and in Cropland – for example related to inter-annual variations in climate and world market prices. In 2008, 2010, 2011 and 2012 the net result was removals (negative emissions in Figure 5.13). In the projections similar inter-annual variations cannot be projected and the projected total is rather stable. Trends in the projection of emissions and removals by the sub-categories in the LULUCF sector are different for the different sub-sectors..

It should be noted that only specific parts of the LULUCF emissions and removals estimated in accordance with the rules under the UNFCCC are to be taken into account under the Kyoto Protocol in accordance with Articles 3.3 and 3.4 of the protocol. This is further described in Section 5.1.5.5 above.

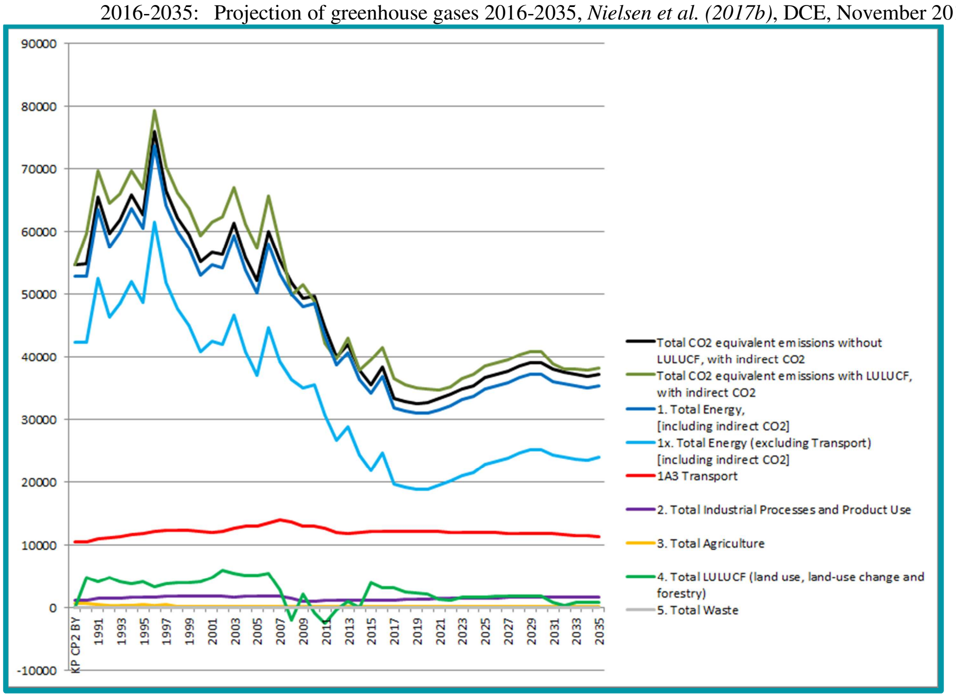
TABLE 5.14 PROJECTIONS OF DENMARK'S CO_2 EMISSIONS IN KT OF CO_2 IN 2016 - 2035 AND EMISSIONS OBSERVED IN 1990-2015

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

CO_2 emissions and projections (kt CO_2)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**54785**	**54808**	**62752**	**55170**	**52257**	**49727**	**47148**	**35559**	**35672**	**32686**	**36758**	**39005**	**37276**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	54794	59664	66888	59316	57426	48851	46434	39618	38011	34956	38525	40920	38214
1. Total Energy, [including indirect CO_2]	**52873**	**52894**	**60554**	**53023**	**50222**	**48545**	**45755**	**34134**	**34163**	**31052**	**34957**	**37132**	**35358**
1x. Total Energy (excluding Transport) [including indirect CO_2]	42297	42317	48636	40900	37120	35552	32860	21943	22050	18876	22915	25259	24019
1A3 Transport	10577	10576	11918	12124	13102	12992	12895	12192	12113	12176	12042	11873	11339
2. Total Industrial Processes and Product Use	**1276**	**1278**	**1642**	**1860**	**1795**	**1008**	**1188**	**1226**	**1281**	**1416**	**1587**	**1661**	**1707**
3. Total Agriculture	**619**	**619**	**537**	**268**	**222**	**156**	**186**	**177**	**209**	**200**	**196**	**193**	**193**
4. Total LULUCF (land use, land-use change and forestry)	**9**	**4856**	**4136**	**4146**	**5169**	**-876**	**-714**	**4059**	**2339**	**2270**	**1767**	**1915**	**938**
5. Total Waste	**18**	**18**	**20**	**18**	**18**	**18**	**19**	**21**	**19**	**19**	**19**	**19**	**19**

FIGURE 5.16 PROJECTIONS OF DENMARK'S CO_2 EMISSIONS IN KT OF CO_2 IN 2016 - 2035 AND EMISSIONS OBSERVED IN 1990-2015

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



5.1.7.2 Methane (CH_4)

Most of the methane emissions come from farm animals' digestive systems (enteric fermentation). The results of the projections are shown in Table 5.15 and Figure 5.17. The very small changes in emissions from agriculture from 1990 to 2035 are primarily due to very little changes in cattle stocks. The next largest source of methane is landfills, from which emissions were reduced from 1990 to 2015 and will continue to decrease in the projection period primarily due to the decrease in formation of methane in old landfills after the ban on landfilling of combustable waste in 1997. Methane emissions from the energy sector have, however, increased considerably until 1999 due to an increase in the use of gas-driven motors. This increase was followed by a stabilisation which seems to continue in the projection period.

Altogether total methane emissions decreased from 7,624 kt of CO_2 equivalents in 1990 to 6,849 kt of CO_2 equivalents in 2015, whereas the baseline projection for 2016-2035 shows a further decrease until 2020 followed by a slight increase until it reaches 6,617 kt of CO_2 equivalents in 2035.

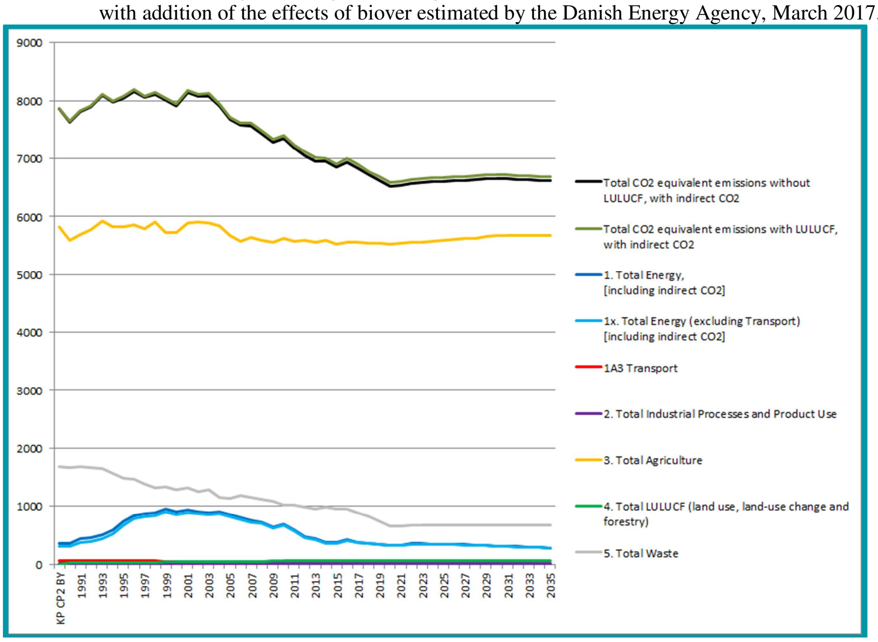
TABLE 5.15 PROJECTIONS OF DENMARK'S METHANE EMISSIONS IN KT OF CO_2 EQUIVALENTS 2016 – 2035, EMISSIONS IN 1990-2015 ARE OBSERVED

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.

CH_4 emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**7864**	**7624**	**8051**	**7907**	**7671**	**7347**	**7261**	**6849**	**6796**	**6518**	**6606**	**6651**	**6617**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	7864	7643	8078	7943	7715	7399	7313	6909	6857	6583	6672	6717	6684
1. Total Energy, [including indirect CO_2]	**364**	**364**	**730**	**907**	**851**	**692**	**624**	**365**	**375**	**327**	**344**	**315**	**281**
1x. Total Energy (excluding Transport) [including indirect CO_2]	308	308	673	861	818	673	605	354	365	320	337	308	274
1A3 Transport	57	57	57	46	33	18	19	11	10	7	7	7	6
2. Total Industrial Processes and Product Use	**2**	**2**	**3**	**3**	**4**	**2**	**3**	**4**	**3**	**3**	**3**	**3**	**3**
3. Total Agriculture	**5824**	**5585**	**5831**	**5719**	**5682**	**5633**	**5588**	**5524**	**5550**	**5534**	**5590**	**5669**	**5669**
4. Total LULUCF (land use, land-use change and forestry)	**0**	**19**	**27**	**35**	**44**	**51**	**53**	**60**	**62**	**66**	**66**	**66**	**66**
5. Total Waste	**1674**	**1672**	**1489**	**1278**	**1134**	**1021**	**1046**	**955**	**867**	**653**	**669**	**664**	**664**

FIGURE 5.17 PROJECTIONS OF DENMARK'S METHANE EMISSIONS IN KT OF CO_2 EQUIVALENTS 2016 – 2035, EMISSIONS IN 1990-2015 ARE OBSERVED

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017 with addition of the effects of biover estimated by the Danish Energy Agency, March 2017.



5.1.7.3 *Nitrous oxide, N_2O*

Agriculture is by far the main source of emissions of nitrous oxide because this forms in soil through bacterial conversion of nitrogen in fertiliser and manure. The results of the projections are shown in Table 5.16 and Figure 5.18. The main reason for the reduction in total nitrous oxide emissions from 7.882 kt CO_2 equivalents in 1990 to 5,182 kt CO_2 equivalents in 2015 is a combination of the Action Plans for the Aquatic Environment I and II and the Action Plan for Sustainable Agriculture. The baseline projection for 2016-35 shows an increase again until 2017 with a minor increase thereafter until an emission of 5,481 kt CO_2 equivalents is reached in 2035. Another substantial reduction is due to the fact that Denmark ceased to produce nitrous acid in 2004, as shown under Industrial Processes and Product Use in Figure 5.18. Contributions from the other sector categories are minor and in general they show no particular trends.

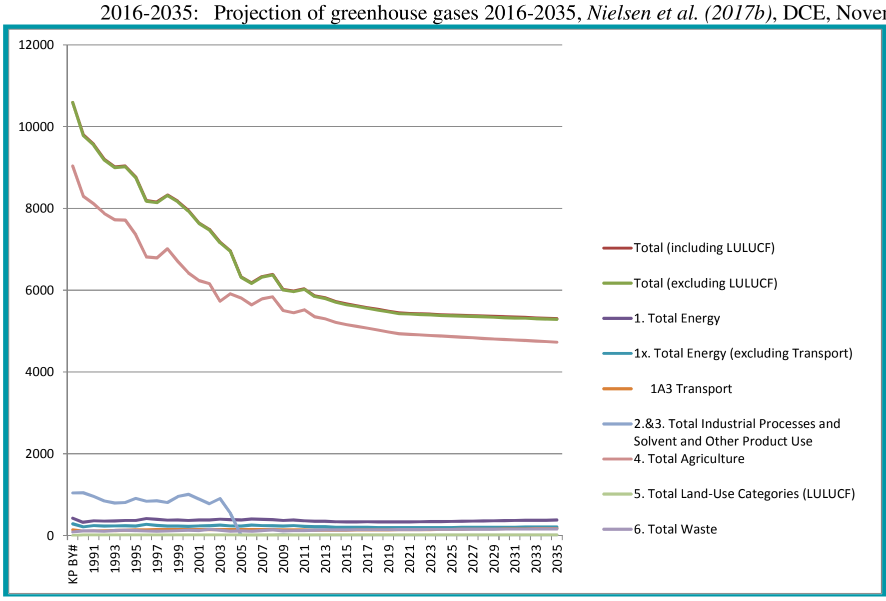
TABLE 5.16 PROJECTIONS OF DENMARK'S NITROUS OXIDE EMISSIONS IN KT OF CO_2 EQUIVALENTS IN 2016-2035, EMISSIONS IN 1990-2015 ARE OBSERVED

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

N_2O emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**7799**	**7882**	**7134**	**6926**	**5472**	**5139**	**5210**	**5182**	**5290**	**5415**	**5460**	**5473**	**5481**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	7799	7909	7161	6953	5499	5166	5237	5216	5320	5445	5491	5505	5515
1. Total Energy, [including indirect CO_2]	**362**	**361**	**443**	**484**	**445**	**431**	**406**	**389**	**384**	**368**	**391**	**389**	**385**
1x. Total Energy (excluding Transport) [including indirect CO_2]	262	260	326	369	338	317	291	255	249	226	244	240	238
1A3 Transport	100	101	118	115	107	114	116	134	135	142	146	149	148
2. Total Industrial Processes and Product Use	**1021**	**1021**	**889**	**985**	**19**	**19**	**19**	**20**	**19**	**19**	**19**	**19**	**19**
3. Total Agriculture	**6342**	**6427**	**5712**	**5241**	**4884**	**4537**	**4631**	**4597**	**4710**	**4838**	**4843**	**4840**	**4834**
4. Total LULUCF (land use, land-use change and forestry)	**0**	**27**	**27**	**27**	**27**	**27**	**27**	**34**	**30**	**30**	**31**	**32**	**34**
5. Total Waste	**74**	**74**	**90**	**217**	**124**	**151**	**153**	**176**	**177**	**189**	**207**	**225**	**243**

FIGURE 5.18 PROJECTIONS OF DENMARK'S NITROUS OXIDE EMISSIONS IN KT OF CO_2 EQUIVALENTS IN 2016-2035, EMISSIONS IN 1990-2015 ARE OBSERVED

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



5.1.7.4 Industrial gases HFCs, PFCs and SF_6

In accordance with the possibilities offered in the Kyoto Protocol, Denmark has chosen 1995 as the base year for emissions of the industrial gases, or F-gases, HFCs, PFCs and SF_6. Total emission of these gases corresponded to 344 kt CO_2 equivalents in 1995 and seems to have peaked in 2008 with 1,041 kt CO_2 equivalents.

The decrease in the rate of increase until 2008 is primarily due to taxes and regulations introduced concerning the use of new installations/products.

In the baseline projection of total F-gas emissions, emissions are expected to decrease rapidly until 2027, after which only minor and slow further reductiona are expected until a level of 127 kt CO_2 equivalents is reached in 2035.

As can be seen from Table 5.17 and Figure 5.19, the trends for the three individual types of F-gas are very different due the different uses of these gases. With HFCs being the major contributor, the trend for HFC emissions follows the trend for total F-gas emissions closely.

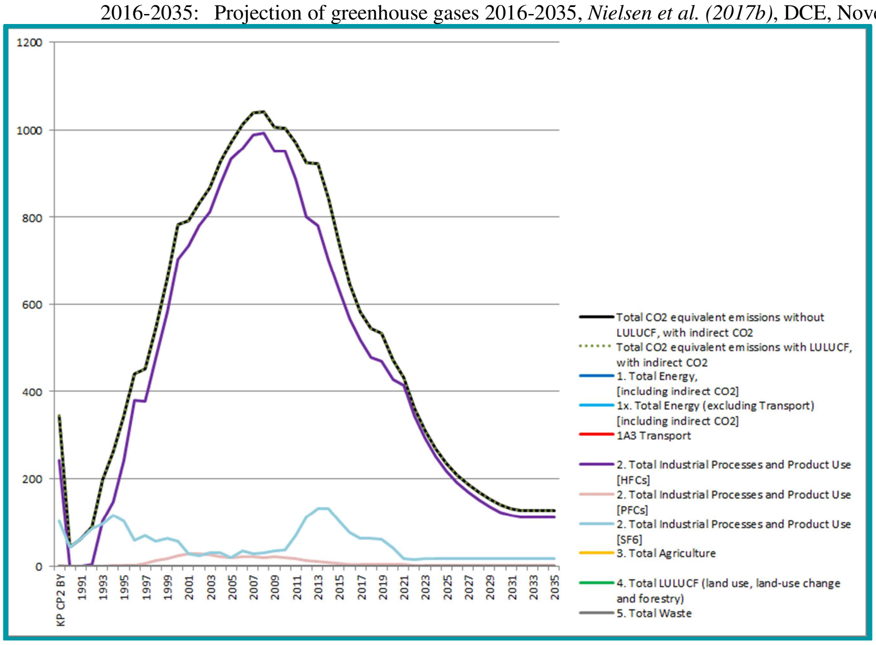
TABLE 5.17 PROJECTIONS OF DENMARK'S INDUSTRIAL GREENHOUSE GAS EMISSIONS (THE F-GASES) IN KT OF CO_2 EQUIVALENTS IN 2016-2035. EMISSIONS IN 1990-2015 ARE OBSERVED. UNDER THE KYOTO PROTOCOL THE BASE YEAR FOR THE F-GASES IS THE EMISSION LEVEL IN 1995.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.

F-gas emissions and projections (kt CO_2 equivalents)	KP CP2 BY	1990	1995	2000	2005	2010	2008-12	2015	2013-20	2020	2025	2030	2035
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**344**	**42**	**344**	**782**	**971**	**1005**	**990**	**742**	**661**	**472**	**235**	**141**	**127**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	344	42	344	782	971	1005	990	742	661	472	235	141	127
1. Total Energy, [including indirect CO_2]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
1x. Total Energy (excluding Transport) [including indirect CO_2]	0	0	0	0	0	0	0	0	0	0	0	0	0
1A3 Transport	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Total Industrial Processes and Product Use [HFCs]	**241**	**0**	**241**	**704**	**933**	**950**	**916**	**634**	**572**	**428**	**217**	**123**	**111**
2. Total Industrial Processes and Product Use [PFCs]	**1**	**0**	**1**	**23**	**19**	**19**	**17**	**5**	**5**	**3**	**2**	**1**	**1**
2. Total Industrial Processes and Product Use [SF_6]	**102**	**42**	**102**	**56**	**20**	**36**	**56**	**103**	**84**	**42**	**16**	**16**	**16**
3. Total Agriculture	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4. Total LULUCF (land use, land-use change and forestry)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5. Total Waste	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

FIGURE 5.19 PROJECTIONS OF DENMARK'S INDUSTRIAL GREENHOUSE GAS EMISSIONS (THE F-GASES) IN KT OF CO_2 EQUIVALENTS IN 2016-2035, EMISSIONS IN 1990-2015 ARE OBSERVED. UNDER THE KYOTO PROTOCOL THE BASE YEAR FOR THE F-GASES IS THE EMISSION LEVEL IN 1995.

Source: 1990-2015: The National Inventory Report (NIR and CRF), *Nielsen et al. (2017a)*, DCE, May 2017.
2016-2035: Projection of greenhouse gases 2016-2035, *Nielsen et al. (2017b)*, DCE, November 2017.



5.1.7.5 Denmark's total greenhouse gas emissions and removals

Figure 5.1 shows the base year and projections of Denmark's total greenhouse gas emissions and removals. The overall trend and effect of policies and measures is commented on in section 5.1.1. Further details concerning IPCC source and sector categories are contained in Annex C1.

5.2 Projection without measures (WOM-scenario) and Assessment of aggregate effects of policies and measures

5.2.1 Total effects of policies and measures

According to the guidelines for national reporting, projections in National Communications could also include results from projections "without measures", i.e. projections without the expected total effects of policies and measures implemented after a certain point in time.

The Effort Analysis from 2005 includes such a projection of Denmark's greenhouse gas emissions in 2008-2012 excluding measures which were implemented from 1990 to 2001. The results of the *Effort Analysis* are described in Annex B2.

Note that the analysis has been prepared on the basis of a previous projection which includes the effect of measures described in Denmark's Third National Communication as the analysis was started in 2003.

As stated in Annex B2 in the *Efforts Analysis,* it has been estimated that average Danish emissions of greenhouse gases in 2008-2012 would have been 95.6 million tonnes CO_2 equivalents– i.e. about 15.6 million tonnes CO_2 equivalents greater than the previous projection with measures, if the measures initiated in the period 1990-2001 had not been initiated.

In addition, as indicated in Annex B3, it has been estimated that average Danish emissions of greenhouse gases in 2008-2012 would have been around 1 million tonnes CO_2 equivalents per year greater, if the selected and analysed measures initiated after 2001 had not been initiated. However, it should be noted that the analysis described in Annex B3 only contains an evaluation of the effects of certain climate change mitigation measures implemented after 2001 and that the analysed measures have been selected by the National Audit Office. This analysis is therefore not a complete analysis of all measures implemented after 2001. Furthermore it should be noted that within the nine measures selected by the National Audit Office it has been impossible to carry out an analysis for one of them.

In January 2016 estimates of the total effect of the group of policies and measures that promote the use of renewable energy (RE-PAMs) and of the total effect of the group of policies and measures that promote energy efficiency (EE-PAMs) were reported in Denmark's Second Biennial Report (BR2) under the UNFCCC.

Based on the most recent energy statistics (1990-2016, December 2017) and the projection from March 2017 (Energy Outlook 2017) these estimates have been updated for NC7/BR3. Annex B4 includes a brief description of the methodologies used and a graphic presentation of the results for the period 1990-2035, with ex-post results for the period 1990-2016 and ex-ante results for the period 2017-2035.

From the analyses of the effects of policies and measures described in the Annexes B2, B3 and B4 it can be seen that the policies and measures promoting increased production and use of renewable energy (RE) and well as policies and measures promoting energy efficiency and energy savings (EE) are the measures which in the past have affected – and in the future will affect – Denmark's greenhouse gases the most.

With the assumption that policies and measures addressing CO_2 emissions from the energy sector comprises RE- and EE-measures only and that other previously estimated effects of policies and measures for other gases and other sectors are effects which have affected the level of total greenhouse gases in Denmark permanently, the total effect of policies and measures have been calculated – both for the past (so-called ex-post estimates) and for the future (so-called ex-ante estimates). The results are shown in Table 5.18.

TABLE 5.18 TOTAL EFFECTS OF POLICIES AND MEASURES IN KT OF CO_2 EQUIVALENTS IN 2020 AND 2030.

Name of mitigation action	Included in with measures GHG projection scenario	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-mentation	Implementing entity or entities	Estimate of mitigation impact (not cumulative, in kt CO2 eq)**		Source of estimates
										2020	2030	
G3: All RE mitigation actions (Renewable Energy) since 1990	Yes*	Combined (EN-2, EN-3, EN-4, EN-5, BU-8 and TR-8)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	**22805**	**24060**	Estimated in 2017 - sse Annex B4.
G4: All EE mitigation actions (Energy Efficiency) since 1990	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7; EN-1; BU-1, -2, -6, -7, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -10, -11, -12; HO-1, -2, -3, -4, -5, -6)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	**16944**	**18793**	Estimated in 2017 - sse Annex B4.
TD-9: Tax on methane from natural gas fired power plants - equivalent to the CO2 tax	Yes*	Energy	CH4, CO2	Reduction of losses (Energy supply), Control of fugitive emissions from energy production (Energy supply), Methane reduction ()	Economic, Fiscal	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2011	Government:Ministry of Taxation	**30**	**30**	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
TR-12: Investment in a tunnel under the Femern Belt	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Adopted	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2028	Government:Ministry of Transport	**-300**	**200**	Estimates for the construction phase (emissions of 300 kt CO2eq/year) and operation phase (reduktion of 198.5 kt CO2eq/year) in the 2013 EIA for the project, Chapter 19 (https://www.trm.dk/da/publikationer/2013/vvm-for-femern-baelt).
G6(new): F-gas taxes and regulation	Yes*	Combined (TD-8 and IP-1)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	**800**	**800**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
AG-1(expired): Action Plan for the Aquatic Environment I+II and Action Plan for Sustainable Agriculture	Yes*	Agriculture	N2O	Reduction of fertilizer/manure use on cropland (Agriculture)	Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1987	Government:State, Local:Municipalities	**1900**	**1900**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
AG-6: Biogas plants	Yes*	Agriculture, Energy	CO2, CH4	Improved animal waste management systems (Agriculture), Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1987	Government:State	**240**	**207**	2020: "Biogasproduktions konsekvenser for drivhusgasudledning i landbruget" Rapport nr. 197 DCE, 2016 (http://dce.au.dk/udgivelser/vr/nr-151-200/abstracts/nr-197-biogasproduktions-konsekvenser-for-drivhusgasudledning-i-landbruget/); 2030: Preliminary estimate (to be published, in Danish).
AG-12(new): Political Agreement on a Food and Agricultural Package	Yes*	Agriculture	N2O, CO2	Improve the ability of the food and agricultural industry to increase primary production and exports, as well as to contribute to creating growth and jobs, in due interaction with protection of nature and the environment.	Economic, Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2016	Government:Ministry of Environment and Food	**-122**	**-122**	Answer to question no. 391 (ord. part) asked by the parliament's Committee for Environment and Food on 15 Januar 2016 (http://www.ft.dk/samling/20151/almdel/mof/spm/391/svar/1299227/1598927/index.htm , in Danish)
WA-1: A ban of landfill of combustible waste.	Yes*	Waste management/waste	CH4	Reduced landfilling (Waste), Waste incineration with energy use (Waste), Enhanced recycling (Waste)	Regulatory	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1997	Local:Municipalities	**333**	**333**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
WA-7(expired): Support for (construction of facilities for) gas recovery at landfill sites	Yes*	Waste management/waste	CO2, CH4	Enhanced CH4 collection and use (Waste)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	1984	Government:Danish Energy Authority	**205**	**205**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
WA-9: Subsidy programme for biocovers on landfills	Yes*	Waste management/waste	CH4	Improved landfill management (Waste)	Economic	Implemented	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	2017	Government:Danish Environmetal Protection Agency	**300**	**179**	Estimates by the Danish Energy Agency, March 2017 - based on "Virkemiddelkatalog, Tværministeriel arbejdsgruppe, August 2013, Klima-, Energi- og Bygningsministeriet" (https://ens.dk/sites/ens.dk/files/Analyser/virkemiddelkatalog_-_potentialer_og_omkostninger_for_klimatiltag.pdf)
G1(changed): Group of all policies and measures except in the LULUCF sector	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7, -8, -9; EN-1, -2, -3, -4, -5, -6; BU-1, -2, -6, -7, -8, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12; HO-1, -2, -3, -4, -5, -6; IP-1; AG-1, -2, -4a-f, -6, -9, -11, -12, -13; WA-1, -2, -3, -4, -5,- 6, -7, -8, -9)	Combined	Combined	Combined	Combined	See text and Annex F (BR3, Chapter VIII, Table 3 of the CTF)	Combined	Combined	**43135**	**46585**	Calculated as the sum of the effects estimated for G3, G4, TD-9, TR-12, G6, AG-1, AG-6, AG-12, WA-1, WA-7 and WA9.

5.2.2 Projection without measures (WOM-scenario)

As mentioned in Chapter 5.2.1 National Communications could also include results from projections "without measures", i.e. projections without the expected total effects of measures implemented after a certain point in time.

In this chapter the estimated total effects of policies and measures described in Chapter 5.2.1 are added to the greenhouse gas inventory data in the period 1991-2015 and to the greenhouse gas baseline (WEM scenario) projection in the period 2016-2030. The results are shown in Table 5.19 and Figure 5.20.

TABLE 5.19 PROJECTIONS OF DENMARK'S GREENHOUSE GAS EMISSIONS IN THE "WITHOUT MEASURES" SINCE 1990 SCENARIO IN KT OF CO_2 EQUIVALENTS.

Information on updated greenhouse gas projections under a 'without measures' scenario [a] *	GHG emissions and removals [b] (kt CO2 eq)							GHG emission projections (kt CO2 eq)	
	Base year	1990	1995	2000	2005	2010 #	20XX[c]-3 =2015	2020	2030
Sector [d,e]									
Energy**	42885	42885	54685	57466	58440	60100	52301	59201	68690
Transport	10734	10734	12093	12285	13242	13125	12336	12025	12229
Industry/industrial processes***	2343	2343	2878	3631	2945	2409	2569	2745	2659
Agriculture	12631	12631	12810	12689	12688	12226	12199	12350	12480
Forestry/LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
Waste management/waste	1763	1763	1724	1750	1676	1728	1691	1699	1625
Other (specify: Memo item: International bunkers)	4784	4784	6869	6400	4938	4513	4983	5231	5302
Memo item: International Aviation	1748	1748	1841	2336	2560	2425	2652	2899	2971
Memo item: International Navigation	3036	3036	5027	4064	2378	2088	2331	2331	2331
Gas									
CO2 emissions including net CO2 from LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO2 emissions excluding net CO2 from LULUCF	54808	54808	67803	70507	72420	73285	65278	72134	82058
CH4 emissions including CH4 from LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
CH4 emissions excluding CH4 from LULUCF	7624	7624	8177	8144	8071	7885	7417	7386	7398
N2O emissions including N2O from LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
N2O emissions excluding N2O from LULUCF	7882	7882	7865	8388	7372	7039	7082	7193	7251
HFCs	NO,NA	NO,NA	IE	IE	IE	IE	IE	IE	IE
PFCs	NO,NA	NO,NA	IE	IE	IE	IE	IE	IE	IE
SF6	IE	IE	IE	IE	IE	IE	IE	IE	IE
NF3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Other (specify)									
Total F-gases****	42	42	344	782	1127	1379	1319	1307	975
Total with LULUCF [f]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Total without LULUCF	**70356**	**70356**	**84190**	**87821**	**88990**	**89588**	**81095**	**88020**	**97682**

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", at a minimum Parties shall report a 'with measures' scenario, and may report 'without measures' and 'with additional measures' scenarios. If a Party chooses to report 'without measures' and/or 'with additional measures' scenarios they are to use tables 6(b) and/or 6(c), respectively. If a Party does not choose to report 'without measures' or 'with additional measures' scenarios then it should not include tables 6(b) or 6(c) in the biennial report.

[b] Emissions and removals reported in these columns should be as reported in the latest GHG inventory and consistent with the emissions and removals reported in the table on GHG emissions and trends provided in this biennial report. Where the sectoral breakdown differs from that reported in the GHG inventory Parties should explain in their biennial report how the inventory sectors relate to the sectors reported in this table.

[c] 20XX is the reporting due-date year (i.e. 2014 for the first biennial report).

[d] In accordance with paragraph 34 of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", projections shall be presented on a sectoral basis, to the extent possible, using the same sectoral categories used in the policies and measures section. This table should follow, to the extent possible, the same sectoral categories as those listed in paragraph 17 of those guidelines, namely, to the extent appropriate, the following sectors should be considered: energy, transport, industry, agriculture, forestry and waste management.

[e] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors (i.e. cross-cutting), as appropriate.

[f] Parties may choose to report total emissions with or without LULUCF, as appropriate.

* Denmark without Greenland and the Faroe Islands. CO2 and totals are with indirect CO2 emissions. The memo items are not included in the totals. Estimated emissions if the policies and measures implemented since 1990 have not been implemented.

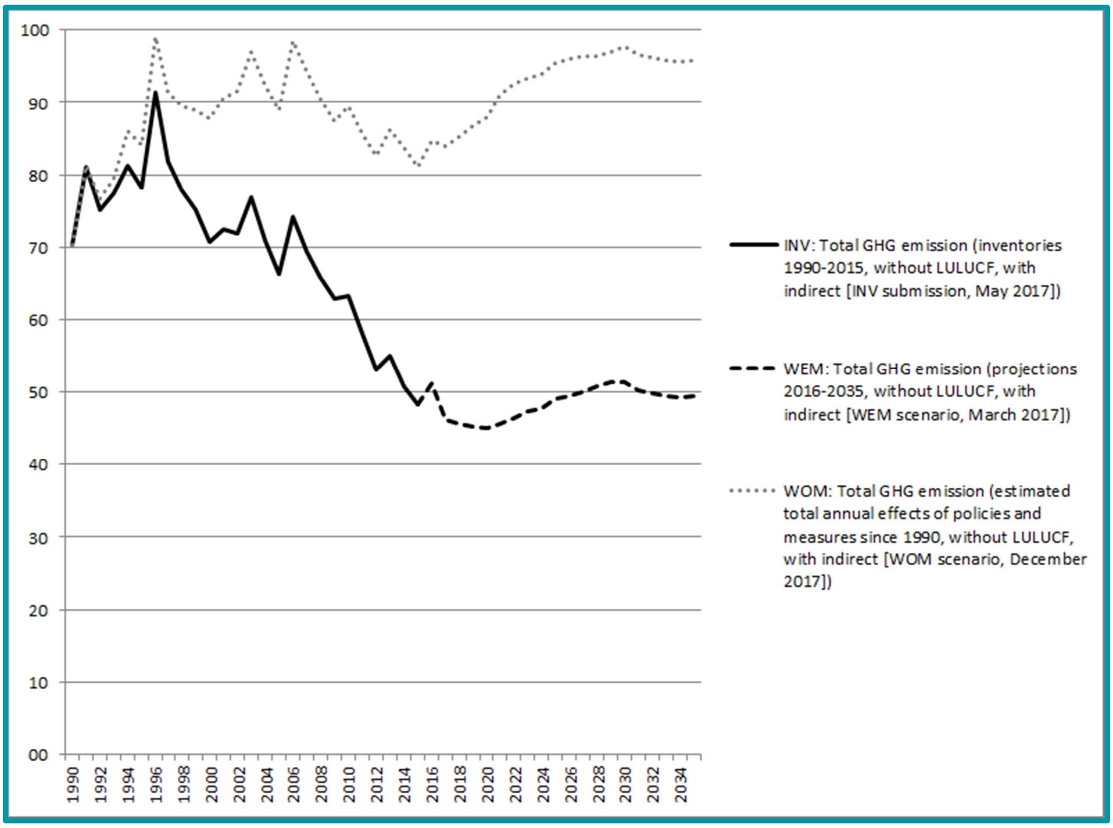
** The IPCC category "Energy" excluding the subcategory "Transport".

*** The IPCC category "Industrial processes and product use".

**** Total F-gases: HFCs + PFCs + SF6

Annual average of estimates for the period 2008-2012

FIGURE 5.20 PROJECTIONS OF DENMARK'S GREENHOUSE GAS EMISSIONS IN THE "WITHOUT MEASURES" SINCE 1990 SCENARIO IN KT OF CO_2 EQUIVALENTS.



5.3 PROJECTION WITH ADDITIONAL MEASURES (WAM-SCENARIO)

In accordance with the reporting guidelines for National Communications, it is also possible to include information on greenhouse gas projections where the expected effects of additional policies and measures that are planned but still not implemented are included.

As described in Chapter 4, the Danish government will in 2018 make proposals for a new energy agreement and a cost-effective strategy for meeting Denmark's reduction target in 2030.

Therefore it is not possible to elaborate a scenario with additional measures "which will have a realistic chance of being adopted" and which will not. And the former is the criteria for measures in the planning stage to be included in a "with additional measures" projection. Thus, a "with additional measures" projection scenario cannot be made until the government has decided which additional measures Denmark should include in its planning. In Denmark implementation of new measures often starts as soon as a decision on an additional measure has been taken. When a final decision has been taken and implementation has started the measure will be included in the first WEM-scenario following the adoption of the measure. The window of opportunity for a WAM-scenario in Denmark is therefore often very narrow or not existing.

5.4 SUPPLEMENTARITY RELATING TO MECHANISMS UNDER ARTICLES 6, 12 AND 17 OF THE KYOTO PROTOCOL

According to the Kyoto Protocol, the use of the mechanisms in Articles 6 (JI), 12 (CDM) and 17 (IET) of the Protocol must serve as a supplement to domestic action to reduce greenhouse gas emissions. This was fulfilled in the first commitment period of the Kyoto Protocol 2008-2012. The second commitment period of the Kyoto Protocol 2013-2020 has not yet entered into force. Should this happen, it should be noted that the Danish Government does not plan to use the Kyoto Protocol mechanisms in the second commitment period. As mentioned above the WEM projection shows that Denmark will achive its target 2013-2020 under the EU Effort Sharing Decision for the non-ETS sectors with existing measures. I.e. there is no need for using the Kyoto Mechanisms in the non-ETS sectors.If the second commitment period of the Kyoto Protocol enters into force, information on the use of Kyoto mechanisms units or credits by Danish entities under the EU-ETS will be available from the EU registry.

5.5 METHODOLOGY USED FOR THE PRESENTED GREENHOUSE GAS EMISSION PROJECTIONS AND COMPARISONS WITH PREVIOUS PROJECTIONS

The methodologies used for the presented greenhouse gas emission projections are described for the relevant sectors in section 5.1.2-5.1.7.

In Annex C3, a comparison of the latest reported greenhouse gas inventory with the "with measures" projections of Denmark's total greenhouse gas emissions included in Denmark's first to seventh national communication is shown. As can been seen, no clear conclusion can be drawn from a plot of the "raw" projection data reported over the period 1995-2015. However, if the data are normalised to take into account the improvements made in inventory reporting over the same period, and if inter-annual variations in temperature and electricity trade, the latter being sensitive to inter-annual variations in precipitation in Norway and Sweden due to these countries' hydropower based production of electricity for the Nordic electricity market, is also taken into account, relatively good correlation between the projections until 2005 in NC1 (1994) and until 2010 in NC2 (1997) and the later actual development can be seen. A closer look into the detailed level of sectors and source categories, however, reveals major differences, but outliers in both directions seem to even out each other in the total due to the relatively high number of separately projected sub-categories.

The projections for 2009-2015 in the NC3 (2003), NC4 (2005) and NC5 (2009) show significant deviations from the 2009-2015 inventory data reported in May 2017. The projections for 2012-2015 in the NC6 (2014) are close to the actual inventory data for 2012-2015 reported in May 2017. This illustrates that projected estimates for years close to the present are more certain than estimates for years more that 3 years into the future.

As a "with measures" projection elaborated at a given point in time only includes the effects of implemented and adopted policies and measures, in many cases also with an end date within the projection period, emissions are projected to increase after the expiration of such policies and measures. The development in the projections shown in Annex C3 can therefore also be seen as an illustration of the main purpose of the WEM projections: to inform governments about future greenhouse gas emissions trends if no new policies and measures are adopted and implemented.

5.6 Greenland and the Faroe Islands

5.6.1 Greenland

Total greenhouse gas emissions in Greenland in 1990, 1995, 2000, 2005, 2010 and 2015 are shown in table 5.20.

Table 5.20 Total greenhouse gas emissions (kt CO_2 equivalents) in 1990, 1995, 2000, 2005, 2010 and 2015

Source: Statistics Greenland (2017).

GHG (kt CO_2 Equivalents)	1990	1995	2000	2005	2010	2015
Total (without LULUCF)	652.48	561.71	697.68	679.00	713.53	557.41
Total (with LULUCF)	652.69	562.10	698.20	679.63	714.95	558.46

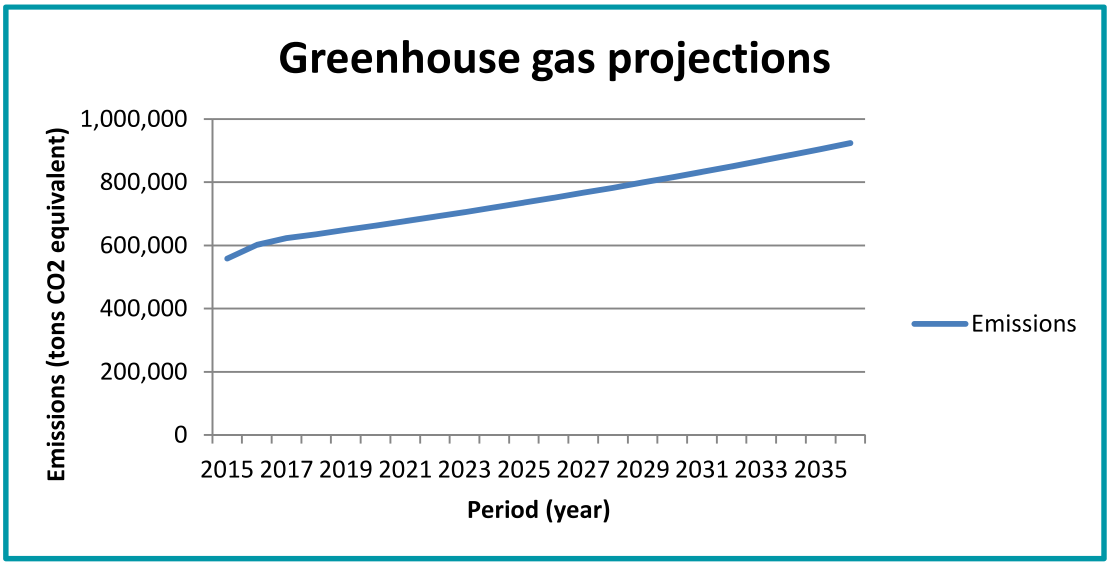
Greenland is likely to experience significant industrial growth over the coming years, which will impact on future emission levels. Possible sources of new emissions include:

- Further growth in the mining industry with the establishment of new mines
- Continuation of oil and gas explorations

A number of exploration projects are ongoing, however the projected emissions related to these projects are subject to a significant degree of uncertainty and future scenarios have therefore not been included.

According to the latest data from Greenland Statistics the total greenhouse gas emissions with LULUCF is recorded at 558,456 tons CO_2 in the year 2015[8]. Greenland's economic council has prepared a national economic outlook which projects the 2016 GDP growth rate at 6.9%[9], while the expected growth rate in 2018 being at 2.6%[11]. This rate has been maintained as a constant value throughout the period 2018 to 2036. Moreover upcoming mining activities in Aappaluttoq and Kangerlussuaq have been accounted for in the projections. The projected Greenlandic total annual greenhouse gas emissions for 2016-2036 are shown in Figure 5.19 together with the inventory's total for 2015.

FIGURE 5.19 GREENLAND'S TOTAL GREENHOUSE GAS EMISSIONS IN KT IN 2015-36, EMISSIONS IN 2015 ARE OBSERVED AND 2016-2036 PROJECTED



[1] DEA 2017: *Basisfremskrivning 2017*, Danish Energy Agency, March 2017 (in Danish: https://ens.dk/service/fremskrivninger-analyser-modeller/basisshyfremskrivninger / in English: https://ens.dk/en/our-services/projections-and-models/danish-climate-and-energy-outlook)

[2] *Nielsen et al. (2017b):* Projection of greenhouse gases 2016-2035. Nielsen, O-K., Plejdrup, M.S., Winther, M., Hjelgaard, K., Nielsen, M., Hoffmann, L., Fauser, P., Mikkelsen, M.H., Albrektsen, R., Gyldenkærne, S. & Thomsen, M. 2017. Aarhus University, DCE – Danish Centre for Environment and Energy, Scientific Report from DCE – Danish Centre for Environment and Energy No. 244 (http://dce2.au.dk/pub/SR244.pdf). It should be noted that the projection results in this DCE report deviate slightly from the results in the DEA report as the estimated effects of biocovers are not included in the DCE report.

[3] After publication of the projection report in March 2017, the European Commission adopted in August 2017 a decision with revised target paths 2017-2020 for the EU Member States. When the revised target path for Denmark, primarily due to the inclusion of indirect CO_2 emissions both in 2005, 2008-2010 and the target years, is taken into account, the accumulated surplus 2013-2020 is expected to increase and the greenhouse gas emissions in the non-ETS sector to be below the target path also in 2020.

[4] Environmental satellite models for ADAM, NERI Technical Report no. 148, DMU 1995.

[5] Wind power can reduce gross energy consumption if the new capacity replaces thermal electricity production, since there is no loss from converting from fuel to electricity in the case of wind power.

[6] Gross final energy consumption has been calculated by adding cross-border trade, electricity and district-heating distribution losses and own consumption in connection with district heating and electricity production to final energy consumption, less consumption for non-energy purposes.

[7] The anticipated 5.5% biofuel share is lower than required pursuant to the Biofuel Act; however, since the Act allows for second generation biofuels to be multiplied by 2 (i.e. to count double), the legal requirement will have been met nonetheless.

[8] http://www.stat.gl/dialog/main.asp?lang=da&version=201702&sc=EN&subthemecode=t2&colcode=t

[9] http://naalakkersuisut.gl/~/media/Nanoq/Files/Attached%20Files/Finans/ENG/GOR%202017%20rapport%20ENG.pdf

6

VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES

6 Vulnerability assessment, climate change impacts and adaptation measures

6.1 EXPECTED IMPACTS OF CLIMATE CHANGE

6.1.1 Climate in the future

The climate is changing, and in all likelihood we will see more changes in the future. In the long term, the future climate is strongly dependent on the future emissions of greenhouse gasses and other substances that influence the climate. The development in greenhouse gas emissions is especially dependent on three factors: demographic development, the rate and spread of implementation of energy-efficient technologies, particularly in the energy and transportation sectors, and the socio-economic development in general. The changing climate with rising temperatures, changing precipitation patterns, an increase in extreme weather events and rising sea levels will have a broad impact on ecosystems and society in general.

In relation to future global climate change, Denmark is a robust country. This is primarily because of a long tradition of legislation which prevents building in river valleys, along the coast and in forests. Agricultural land is well-drained and many farmers are able to irrigate in dry periods. Moreover, the Danish population is aware of, and uses, systematic warning systems of extreme weather events and the consequences of such events.

6.1.2 Climate trends in Denmark

6.1.2.1 The latest developments

Since the Ice Age, Denmark has had a temperate maritime climate. This climate, with wet winters and cool summers, is now changing. The latest statistics[1] from the Danish Meteorological Institute (DMI) show that the mean temperature is now above 8.6°C (1991-2016), an increase of about 1.5°C since the end of the 19th century. This increase is about double the increase of the global mean temperature for the same period. Today the average winter temperature in Denmark is often above 2ºC, and the average summer temperature is about 16ºC.

The annual precipitation measured in Denmark is now about 755 mm (1991-2016). Precipitation has increased by about 15% – or 100 mm – since the first recordings were begun in 1874. Precipitation is greatest in the western and southern part of Jutland, with almost 1000 mm annual precipitation, and least precipitation is measured in the eastern parts of Denmark (Zealand and the other eastern islands), where about 600 mm of precipitation is recorded annually. In general wet areas experience the greatest increase in precipitation. Correspondingly, precipitation has increased most in western Jutland, by about 20% in the past 85 years.

The Danish climate has become more maritime in the 20th century. On average, cloud cover has increased by about 5 percent since observations began in 1874. With the clouds, more precipitation has come, there are fewer days with snow cover, and temperatures are higher. The direct consequences, such as decreased need for ice-breaking, shorter sledging season, earlier pollen season, longer growing season and longer swimming season, can already be felt by the Danish population.

The sea level around Denmark has risen over the past 115 years. The maximum observed rise is in southern Denmark, where the water level is rising by about 1.5 mm per year. In the northern-most part of Denmark uplift of the land after the Ice Age is roughly in line with the rise in sea level.

6.1.2.2 Projected climate changes in Denmark

DMI has estimated the expected climate change in Denmark based on the latest Danish and European scenario calculations focusing on climate change towards the end of this century[2]. The assessment of future climate change is based on the scenarios used by the Intergovernmental Panel on Climate Change (IPCC), and changes are expected to increase towards the end of this century.

Climate simulations and understanding of associated uncertainties are constantly being improved. DMI here presents the latest results based on IPCC, BACC, European studies and the Danish CRES project where a number of climate simulations performed with several regional and global climate models. Projection of future climate change based on an ensemble of climate models is more robust than estimates based on a single model.

Future sea level rise depends on melting of snow and ice on land and ocean heating. The amount of melting ice is associated with large uncertainties. The observed sea level around Denmark since 1900, corrected for land rise, is presented together with scenarios of future sea level rise.

For specific planning, assessment and risk analysis of climate adaptation, it is important to consider the full range estimate as indicated by the uncertainty interval in the report, instead of simply considering the best estimate.

Climate changes are expected to increase towards 2100 in terms of higher temperatures, more winter precipitation, more frequent and more extreme weather events as well as sea level rise.

All changes quoted below for the climate in Denmark are in relation to the reference period 1986-2005, unless otherwise stated.

- **Temperature**: The future projection is highly dependent on emissions scenario. By the end of the century (2081-2100) the expected temperature increase in Denmark, relative to 1986-2005, is about 1.2 °C both for summer and winter for the RCP2.6 scenario. For the RCP8.5 scenario the expected temperature increase is 4.0 °C for the summer season and 3.7 °C for the winter season.
- **Precipitation**: Global warming increases the water content in the atmosphere, leading to increased global precipitation. For Denmark, this is also the case. Towards 2100 there is a tendency towards increased precipitation with the largest increase in the winter season. Summer precipitation is expected to increase in Northern Scandinavia and decrease in Central, Eastern and Southern Europe, and Denmark will likely be on the border between these two zones, making predictions of future overall summer precipitation in Denmark rather uncertain, but the summer precipitation will be characterized by longer dry spells and more heavy precipitation events (see Table 6.1).
- **Wind:** Mean wind is expected to increase slightly towards the end of the century, while the dominant wind direction is more likely to be west. The strength of storms and hurricanes is likely to increase.
- **Sea level:** The sea level is rising at all Danish coastlines, except in the northern Jutland. Further sea-level rises are expected in the future due to climate change. For 2081-2100 relative to 1986-2005, the sea level around Denmark is expected to increase by 0.34 (0.1-0.6) m for the RCP2.6 scenario

and 0.61 (0.3-0.9) m for RCP8.5. DMI asesses a small risk in the order of 5% for sea level rise for 2081-2100 relative to 1986-2005 above 1.2 m. The uncertainty is largely due to the contribution from melting glaciers and ice sheets. In the northern part of the country, the sea-level rise will be partly compensated by land uplift.

- **Extreme events and other climate parameters**: Computer models show that an increased green-house effect results in changes in frequency, intensity and duration of extreme weather events. Denmark will experience an increase in the frequency and duration of heat waves. Summers will be characterised by longer dry spells and an increase in heavy precipitation events. The occurrence of days with sub-zero temperatures will decrease dramatically, while the length of the growing season will increase. The increase in sea level will give rise to increased storm-surge height. Additionally, future changes in wind patterns are estimated to increase the storm-surge height with 0.3 m along the west coast of Jutland towards 2100, while less change is expected in inner Danish waters In Esbjerg on the west coast of Jutland, a storm surge event of 4.35 m, which today has a 400-year recurrence interval, is expected to have a recurrence interval of 10 years towards the end of the century. For Copenhagen a 100-year storm-surge event of 1.5 m today is expected to occur every 2 years if the mean sea level increases by 0.5 m.

TABLE 6.1 FUTURE CHANGES IN PRECIPITATION FOR DENMARK 2081-2100 RELATIVE TO 1986-2005

Precicipation change [%]	RCP2.6	RCP8.5
Annual	1.6 (±4.6)	6.9 (±6.1)
Winter	3.1 (±7.9)	18.0 (±12.0)
Spring	3.7 (±11.1)	10.7 (±12.6)
Summer	-0.5 (±9.6)	-16.6 (±21.0)
Autumn	0.8 (±7.2)	10.2 (±10.9)

6.1.3 Mapping the impacts of climate change in Denmark

The impacts of possible climate change in Denmark have been evaluated several times, most recently in the 2012 report by the Task Force on Climate Change Adaptation: Mapping climate change – barriers and opportunities for action[3].

A review of the significance of climate change up to 2050 for the individual sectors and industries shows that Danish society may experience both positive and negative impacts.

The positive impacts will relate primarily to the higher temperatures that will result. in, e.g a longer growing season and increased productivity for forestry and agriculture. Milder winters will moreover reduce energy consumption and construction costs, as well as the costs of winter-weather preparedness and road salt.

The negative impacts of climate change will relate primarily to more frequent extreme rainfall, elevated sea levels and more powerful storms, which can lead to flooding and damage to infrastructure and buildings as well as erosion along coasts.

In the following sections the impacts in individual sectors and industries are further described.

6.1.3.1 Construction and housing

Climate change will have both positive and negative impacts for buildings. These include primarily:

- More extreme rainfall events will lead to more flooding:
  The most important challenge will probably come from increased precipitation. Heavy rainfall may lead to more basements being flooded by intruding rainwater and sewage water. Houses and buildings with entrances at terrain level may also be exposed. A gradually rising sea level and more frequent storm-surge events in combination with heavy precipitation may put low-lying and coastal urban areas at risk, see the section on water.

- Greater air humidity and less frequent sub-zero temperatures are significant for the wear on buildings:
  Milder winters with greater humidity may affect buildings and reduce the life span of individual building components. This can be mitigated though greater focus on management and maintenance. However, less frequent sub-zero temperatures may help reduce the wear and tear on buildings.

- More powerful storms and changes in snowfall may damage buildings:
  Powerful storms may pose a risk of damage to buildings, including damage to roof constructions from storms and greater snow load. The latter will often be manageable through roof snow removal. In addition to this, there will probably be a need for increased maintenance and, in some situations, reinforcement of the building.

- Less demand for heating during winter, but risk of poorer indoor climate:
  Milder winters may in general entail a reduced demand for heating. At the same time more humid winters may result in a more humid indoor climate providing better conditions for house dust mites and increasing the risk of mould, see the section on human health. A more humid climate may also result in greater demand for maintenance of building envelopes.

- Greater risk of overheating:
  Large window sections facing south, and longer periods with warm weather in the summertime may pose a risk of overheating in buildings, which will have to be addressed when designing highly insulated buildings. The problem has already been addressed in the building regulations' provisions on energy efficiency classes 2015 and 2050, which stipulate requirements on maximum indoor temperature.

- Changes in productivity in the construction industry:
  A more humid climate, in particular during winter, may mean longer drying times and may pose the risk of damage to building materials, all of which may affect parts of the construction industry. However, the industry can prepare for this by using and further developing methods and materials which reduce the significance of the climate during the construction phase. Climate change could also result in fewer bad-weather days due to milder winters (fewer days with sub-zero temperatures). This will help enhance productivity in the industry.

6.1.3.2 Coasts and ports

Based on future projections of climate change, key consequences for Danish coasts and ports will include:

- Higher storm-surge water levels will increase erosion and coastal recession: This is the implication of the general increase in sea level and the fact that the coasts are being impacted by higher waves during more frequent and more powerful storms, which will lead to increased erosion and recession of the coastline relative to today. The flatter the coastal part of the seabed, the greater the erosion. Erosion will be most pronounced for the west coast of Jutland and less pronounced for other Danish coasts. Built-up areas in low-lying coastal areas will be at risk from higher storm-surge water levels and more frequent flooding. Furthermore, houses and other buildings near the coast will be at risk from erosion.

- More frequent flooding of low-lying coastal areas:
  Low-lying land not protected by dykes will be exposed to more frequent flooding. At the same time, the risk of water breaching existing dykes will increase. Urban developments at the mouth of rivers, e.g. in fjords, may come under double pressure: from rising sea levels as well as from increased precipitation and run-off from the catchment area.

- More powerful storm surges will make activity at ports more difficult:
  With more powerful storm surges, key areas will be flooded more frequently and this means interruption in port activities and also poses a greater risk of damage to buildings. The same applies to ferry landings. At the same time, more intense storms will pose a greater risk of ships breaking their moorings and causing damage to cranes and other equipment at the port.

- More powerful storm surges put port infrastructure under pressure:
  The port protection that protects the basin itself will be affected to an increasing extent by the waves, and protection will be less effective during high storm surges. In ports where fairways and/or port basins are dredged, the need for dredging will often grow because higher waves will lead to greater sanding.

6.1.3.3 Transport

Based on future projections of climate change, the key consequences for different parts of the transport area in Denmark will be as described in the sections below.

6.1.3.3.1 *Road network*

- Higher temperatures reduce construction costs:
  Higher temperatures during winter will mean that periods with heavy frost will be shorter or will all together disappear. This will provide the opportunity to reduce the thickness of the bottom-most layers of roadbeds, frost protection, and thus the amount of raw materials needed.

- Higher temperatures reduce the need for winter-weather preparedness and salt application:
  Higher temperatures allow for savings on winter-weather preparedness and road salt; this leads to both financial and environmental benefits.

- Temperature increases can have both positive and negative impacts on the roadbed:
  Fewer occurences of sub-zero temperatures may serve to improve the life span of the asphalt. When temperatures fall below zero, this exerts a wear on the road surface which results in loss of stone and cracks. However, asphalt surfacing becomes softer at higher temperatures and its carrying capacity and friction decreases. This problem may be managed by using alternative binding agents. For the underlying gravel and sand layers of the roadbed, the increases in temperature will have a limited but positive effect on the life span.

- Greater water volumes are a challenge for the road network:
  Increased precipitation and rising groundwater level, leading to more flooding events, will be a problem for traffic safety and passability. This will place greater demand on road drainage systems and monitoring of the road network. Flooding not only reduces the carrying capacity of roads, it also shortens their efficient life span. Similarly, increased precipitation amounts may cause road banks to become unstable thereby leading to the risk of landslide.

- Greater water volumes will challenge bridge design:
  For bridges and tunnels, there is a greater risk of reduced carrying capacity of foundations, supporting walls and sheet piles due to higher groundwater levels, regardless of whether this is due to higher sea-water levels or increased rainfall. For constructions founded on sand in particular this may become a problem.

- More frequent storms will pose a challenge for road sign portals:
  More powerful storms will expose road sign portals to greater force.

6.1.3.3.2 *Permanent links*

- Rising water levels and precipitation may affect Danish permanent links:
  For the permanent links cross the Great Belt and the Sound an increase in precipitation will mean a greater amount of surface water which will have to be pumped up from surface drainage systems in tunnels and roads. This in turn means there may be a greater demand for pumping capacity. A rising water level and more powerful storms may combine to enhance the risk of flooding of tunnels and lead to longer periods of interruption. More powerful storms may also mean that bridges will have to be closed down temporarily more often.

6.1.3.3.3 *Rail network*

- Increased water amounts will enhance the risk of flooding and landslides:
  Flooding events and rises in groundwater level will enhance the risk of landslides and embankment failures. A rise in the mean sea level could pose a

problem for rail services where embankment and slope drainage systems divert the water into nearby watercourses that are affected by the rise in sea level. Damming up of water in the watercourse could affect the water level in trenches.

- More powerful storms could lead to breakdowns of overhead wires and fallen trees:
  On electrified railway lines, powerful storms and greater wind speeds may lead to greater frequency of breakdowns of overhead wires and to more incidents with trees falling across the tracks. This may result in interrupted train services with consequences for traffic and for the economy.

6.1.3.4 Water

Based on climate projections for the future, the key consequences for water are described in the sections below.

6.1.3.4.1 *Wastewater and flooding*

- More precipitation will increase the pressure on the sewerage system:
  More frequent events with extreme precipitation could mean that the capacity of sewers is exceeded more often, leading to greater risk of overflow events and subsequent flooding of terrain, buildings and basements, which, in turn, poses a risk to human health. More overflow events will also lead to greater strain on vulnerable aquatic areas from pollution. Furthermore, an increased seal level will deteriorate the drainage capacity of drains close to the coast, as reduced water flow in the sewerage system may lead to local flooding events.

- More precipitation means that vulnerable areas will be at higher risk of flooding:
  Increased precipitation will affect watercourses and low-lying land, resulting in a higher risk of local flooding events. At the same time, the increase of groundwater recharge could also mean more frequent flooding from wastewater.

6.1.3.4.2 *Groundwater and water supply*

- More precipitation means higher annual groundwater recharge:
  The increase in annual precipitation will increase groundwater recharge, and this will increase the size of the groundwater resource available for water recovery. However, seasonal variations mean that this will primarily be in the winter and there are regional variations between east and west Denmark. In the summer there will be less flow into lakes and rivers. Increased groundwater recharge in the upper strata could give more local flooding problems.

- Long periods of drought may bring water supply under pressure:
  Ever longer periods of drought are expected in the summer periods and these will put more pressure on the water supply, especially in areas which are already affected by water catchment for larger cities and to irrigate fields.

Therefore, in exposed areas it is likely that groundwater extraction will be adjusted to maintain water flow in watercourses.

- Higher temperatures mean more bacteria in drinking water:
  Higher temperatures may mean a slightly higher content of bacteria and amoeba in drinking water compared with current levels. Today it can already be difficult for some waterworks to comply with the recommended requirements for the temperature of drinking water of max. 12°C at the tap.

- Higher sea levels may add saltwater to the groundwater:
  Higher sea levels will move the current freshwater boundaries further inland. Locally, this could cause problems with saltwater infiltration into coastal extraction wells and create a need for new wells. The problem is especially serious for smaller islands.

6.1.3.5 Agriculture

The most important effects of climate change for agriculture are as follows:

- Increases in temperature will be favourable for many crops:
  Crops such as grass, sugar beets and maize will benefit from increases in temperature as the length of the growing season determines the yield. Even now there is a change in Denmark towards growing more maize. A longer growing season for grass fields may also mean longer grazing periods.

- More CO_2 means increased yields:
  More CO_2 in the atmosphere will increase yields. If the CO_2 concentration doubles, the yield is likely to increase by around 20% for most crops.

- Higher temperatures extend the production season for vegetables and fruit:

For field vegetables and fruit, higher temperatures, especially in the spring and autumn, will mean an extended production season with a clear market advantage. There will also be possibilities for new crops, for example more Danish wine may be produced.
• Higher overall yields for agriculture may give more nitrogen and phosphorus run-off:
Increasing yields involves a greater need for fertilizer use. Furthermore, higher temperatures and winter precipitation will increase the risk of nitrogen and phosphorus leaching and run-off into the aquatic environment.

- Rising temperatures mean lower yields for annual crops:
  Temperature increase will reduce the length of the active growing period for annual crops such as cereal and rape, and thereby reduce the yield as the crops will mature earlier. Increases in temperature may also lead to significant variations in yields.

- Increased winter precipitation and increasing water levels mean poorer agricultural exploitation:
  Increased winter precipitation and rising water levels in some areas will lead to flooding or to groundwater levels which are so high that security of cultivation will be difficult to maintain. This may be particularly relevant along a number

of fjords and watercourses, but there may also be problems for other drained areas with poor drops to watercourses in the event of greater precipitation intensity.

- Longer periods of drought increase the need for irrigation and watering:
  Longer periods of drought during the summer mean a greater need to water crops artificially, especially on sandy soil. Higher temperatures also increase evaporation, but much of this effect is countered by less evaporation from plants due to higher concentrations of CO_2 in the atmosphere. Changing crop types to more maize will also increase the need for irrigation and artificial watering. More artificial watering may have an effect on summer flows in water courses.

- Higher temperatures strengthen some species of weed:
  Some weed species will benefit from a warmer climate, e.g. cockspur and green bristle grass, both of which are relatively new species in Denmark. These species are considered some of the most aggressive globally, but so far they have not been a serious problem in Denmark.

- Higher temperatures could result in more plant diseases and pests:
  It is very hard to give a clear-cut description of the developments in plant diseases, but the overall assessment is that higher temperatures in the future will be more favourable for a number of plant diseases and pests, which therefore will become more widespread. This will potentially increase the need for use of pesticides, in lack of viable alternatives

- Rising temperatures change conditions for exotic diseases in animals:
  Rising temperatures could change conditions for the incidence of animal diseases which are currently regarded as 'exotic' in Denmark. Vector-borne diseases are an example of this, as small changes in temperatures and humidity can enable ticks and mosquitoes to establish themselves in new locations. The vector-borne disease known as blue-tongue was considered an exotic disease some years ago. In just a few years it has spread to most EU countries with consequent comprehensive vaccination programmes.

- Rising temperatures in soils increase the rate of microbial digestion of organic material leading to a loss of carbon stock in agricultural soils.

6.1.3.6 Forestry

The most important impacts for forestry are as follows:

- Rising temperatures mean longer growing seasons and larger biomass production:
  Higher temperatures and higher CO_2 content in the atmosphere may cause greater plant growth and thus greater inland biomass production. Because of the warmer climate, the growing season for trees will also be lengthened.

- Increased storm intensity affects wood production and biodiversity:
  Increased storm intensity (5-10%), as well as increased storm risk, may lead to more trees being blown down (especially conifers which comprise about one-half of the Danish forest area) and more frequent forest storm damage. This can

affect wood production and cause a loss in biodiversity in forests, if forest storm damage occurs in large, cohesive areas.

- Drought stress and storms affect forest trees:
  Forest trees are vulnerable to climate change (drought stress and storms). This also increases their vulnerability to harmful diseases and pests. Pests and diseases can attack trees more easily, weakening the wood and rotting or drying it out.

- Higher summer temperatures increase the risk of more forest fires:
  As a result of the warmer climate, there is a risk of more forest fires, which are already widespread in southern Europe.

- Rising temperatures change the species composition of forests.
  Tree species have different ways of dealing with climate change. Norway spruce, which covers about 17% of Danish forest land, is threatened by temperature increases as the species cannot cope very well with mild winters and summer droughts (other, non-indigenous conifer species such as Sitka spruce will cope with increases in temperature better). In contrast, deciduous forests will have better conditions as a result of rising temperatures.

6.1.3.7 Fisheries

The most important effects for fisheries are as follows:

- Rising sea temperatures impact fish stocks:
  Fish are generally adapted to a single temperature interval and rising temperatures will mean a general change in the composition of stocks in Danish waters and thereby also in the resource base for fishing. Stocks which have their southern limit in Danish waters will be affected negatively, while stocks preferring higher temperatures will generally be affected positively. Therefore it is likely that there will be an increase in species preferring warmer waters (e.g. sardine and brisling/sprats) and species preferring colder waters will retreat (e.g. cod in the North Sea).

- Climate change affects species composition:
  Rising sea temperatures and other climate-related changes will affect the species composition throughout the marine ecosystem and thus change food-chains, including the supply of food for fish and fish predators. It is currently unclear whether these changes will make fish populations and ecosystems more or less vulnerable to anthropogenic impacts on the ecosystem such as fishing and eutrophication, and therefore how the fisheries sector will be affected.

- Rising sea temperatures and increased precipitation may cause oxygen depletion:
  Rising sea temperatures, for example in the Baltic Sea and in coastal areas, could lead to more and more serious problems with oxygen depletion, which can cause poorer living conditions for cod, for example. Similarly, increased precipitation and run-off from watercourses could increase run-off of nutrient salts and the risk of oxygen depletion (hypoxia). These factors will also affect fishing.

- Rising sea temperatures encourage disease-promoting bacteria:
  Rising sea temperatures can underpin the incidence of new disease-promoting bacteria and toxic algae, which can threaten fish and shellfish stocks as well as food safety.

- Rising sea temperatures can affect production conditions:
  Rising sea temperatures could accelerate the occurrence of populations of invasive species which may lead to significant changes in ecosystems and thus affect production conditions and therefore fisheries for a number of fish and shellfish species. Similarly, trout production is very sensitive to increases in temperature, and marine rainbow trout farming may be threatened.

- Rising sea temperatures enable alternative farming methods:
  Increases in winter temperatures in particular enable the application of alternative farming methods and farming of other species.

- Increases in precipitation and run-off from watercourses lead to a drop in salt concentration in the Danish Belts and in the Baltic Sea:
  Populations of a number of important fish species in Danish coastal waters are demonstrating local adaptation to the existing salt gradient from the Baltic Sea out to the North Sea. Changes in salt concentration may mean changes in the geographical and temporal distribution of the fisheries resources.

- Strong winds and precipitation affect the development of marine aquaculture:
  More frequent weather events with strong winds and precipitation may impact the possibilities to develop marine aquaculture and may periodically obstruct shellfish harvests in coastal areas because of discharges of untreated wastewater and consequential problems for food safety.

- Drops in pH impact production of a number of organisms:
  Drops in pH levels (acidification) as a result of increasing carbon concentration can affect the production of a number of organisms, including fish and shellfish, because of reduced calcium formation.

- Cumulative effects of climate change:
  There may be cumulative effects from climate change in relation to other anthropogenic impacts. This means that even though the impact of climate change in relation to an organism or ecosystem may be small, the impact may become significant because of other pressures such as increased nitrogen.

6.1.3.8 Energy

Effects for the energy sector are primarily likely to be as follows:

- Milder winters mean less energy consumption:
  With higher average temperature and milder winters, energy needs in the winter will drop. The difference in energy consumption between mild and cold winters is about 20%. However, warmer summers will also mean more needs for cooling, but the effect of this is expected to be less than the effect of milder winters.

- Weather extremes may affect energy-producing facilities:

More extreme weather with more powerful storms may lead to a need to secure installations against changed weather conditions. The effects are limited, however, as wind turbines have been secured against high wind speeds and the vulnerable electricity supply grid will more or less be buried underground. In high winds, wind turbines are cut off which means electricity production will also stop.

- More wind gives more output from wind turbines:
  With stronger winds there is a potential for better exploitation of wind turbines for greater electricity generation. The expected increase in average speeds of 1-2%, however, will only lead to limited additional production with no significant effect on the economy.

- Changed import/export patterns give lower electricity prices:
  Changed precipitation patterns in Sweden and Norway will mean production of more hydropower. Higher temperatures in Norway and Sweden will also reduce electricity consumption for heating in these countries. Both these factors will reduce electricity prices in Denmark.

- Possibility for more biomass production:
  Higher temperatures and higher CO_2 content in the atmosphere may cause greater plant growth and thus greater domestic biomass production. Biomass production can be incorporated in electricity and heating supply and can replace fossil fuels as well as increase security of supply.

6.1.3.9 Tourism

The most important impacts for tourism are as follows:

- Denmark will be an attractive holiday destination for a larger part of the year:
  At the moment, 75% of all tourists visit Denmark in the summer, i.e. June, July and August. With a warmer climate, it is likely that the Danish tourist season will extend towards the whole year, and Denmark will be even more attractive in the high season. An analysis by Deutsche Bank highlights Denmark, with its wide beaches, as the country in northern Europe with the best conditions to meet the future European demand for sun and sand.

- The Mediterranean will be too hot, and this will make Denmark more attractive:
  Although the Mediterranean is currently is the most popular region for tourists in Europe, with a very hot and dry climate, it is expected that, especially in high summer, the Mediterranean will attract fewer tourists. More days of heat waves will increase the probability that it will be so hot that tourists from primarily the north-western part of Europe will seek alternative holiday destinations, and as a replacement for Cyprus, Greece, Malta and Spain, Deutsche Bank[4] points to Denmark amongst other destinations in the temperate zone as an attractive country for summer holidays.

- The current coastal holiday areas will be less attractive because of higher sea levels:

In the medium term, sea-level rises will make a number of current holiday areas along the coast, with holiday centres, holiday houses and camp sites, unusable or less attractive.

- Larger investment in climate protection as a result of heavy downpours:
  The heavy downpours expected in the summer will affect many of the outdoor activities and attractions tourists often demand in Denmark. These also include the large amusement parks such as Tivoli, Dyrehavsbakken, Bonbonland and Fårup Sommerland, which will have to invest in facilities to manage increased amounts of rain.

6.1.3.10 Nature

The most important impacts for Danish nature are described in the following sections.

6.1.3.10.1 *Aquatic environment*

- More precipitation may increase the nutrient load on the aquatic environment:
  Increases in precipitation and changed rainfall patterns are expected to cause more nutrient enrichment in the aquatic environment. In combination with rising temperatures, this will result in greater algae growth, poorer light conditions, more oxygen depletion and possibly consequential fish death.

- More precipitation means increased hydraulic impact of watercourses:
  Increases in precipitation will also mean greater water flow in watercourses and higher sea levels in coastal areas, which may have an impact on animal and plant life.

- Warmer climate can change the species composition:
  Rising temperatures can lead to changes in the biological structure in the aquatic environment - with generally changed species composition and more invasive species.

- Warmer climate leads to increased substance conversion:
  Increases in temperature also mean changed substance conversion in the aquatic environment in which the biological activity/conversion will increase because of increased temperatures.

- More CO_2 in the air causes acidification of the sea:
  The content of CO_2 in water is in a chemical balance with the content in the air. When the content of CO_2 in the air increases, so does the content in water and this causes acidification of the water with potentially large impacts on aquatic ecosystems.

6.1.3.10.2 *Nature and landscapes*

- Higher temperatures and increases in the air's content of CO_2 will enhance biomass production:
  Rising temperatures provide for a longer growing season. At the same time, increased contents of CO_2 in the atmosphere lead to more favourable growth

conditions. In combination, these factors provide for enhanced biomass production in Danish nature.

- Higher storm-surge water levels will probably lead to the loss of habitats along the coasts:
  A higher sea level and more powerful storms could cause coastal erosion and recession, which will reduce and in other ways affect Danish coastal habitats. These problems, however, will be limited up until 2050.

- More frequent and more intense rainfall will lead to more flooding of low-lying land areas:
  Not only along coasts but also in low-lying areas, such as river valleys and meadows, and habitats and the biodiversity living there may come under pressure from more flooding events. There will also be pressure from the lack of opportunity to spread to other habitats and not enough time to adapt to new conditions.

- A warmer climate will alter the species composition:
  More non-native species will be able to exploit a warmer climate to expand their natural habitat to include Denmark, affecting the existing ecosystem and very likely supplanting current species. This applies to all types of ecosystems: terrestrial, freshwater as well as marine ecosystems.

6.1.3.11 Health

The greatest health-related impact is expected to occur during the last part of the period up to the year 2100 when climate change is presumed to be greatest. Noticeable consequences may however occur earlier, e.g. in connection with extreme weather events with heatwaves or flooding.

- Heatstroke and dehydration during heatwaves:
  Heathwaves can lead to e.g. heatstroke and dehydration which at worst may be life-threatening. People in the northern parts of the world are less used to coping with high temperatures than people who live further south. The elderly, patients in hospitals and individuals suffering from certain diseases are at high risk. Infants and young children will also require extra attention.

- Positive as well as negative impacts of staying outdoors:
  The human body creates Vitamin D after only short exposure to the sun, however too much sun exposure can cause skin cancer and melanomacancer. Spending more time outdoors can have positive effects, e.g. in the form of more outdoor physical activity, fewer problems with indoor climate and less disease transmission in kindergartens etc. However, it may also cause more symptoms in people with pollen allergies and possibly also lead to more people becoming allergic to pollen.

- Infections and similar when temperatures increase and in connection with flooding:
  Flooding of built-up areas has been documented to increase the risk of infections in connection with e.g. work to clear up basements flooded by polluted wastewater. There is a risk of health problems if the building is damp and possibly also mould infested. Flooding which affects the access to or the

functioning of important institutions in society may also affect human health. For example, flooding may cause delays in the treatment of patients. Temperature increases and increased risk of extreme weather events will increase the risk of food- and water-borne infections. Outbreaks of a number of tick-borne diseases like inflammation of the brain and Lyme disease will also be a risk. In the long term, there will also be risk of insect-borne diseases that are restricted to tropical or subtropical areas today. After longer periods with warm seawater, an increased concentration of certain marine bacteria will comprise an infection risk for fishermen and swimmers, and there may be more incidents of algal blooms and dangerous jellyfish.

- More powerful storms and extreme weather events can increase the risk of injury:
  More powerful storms, cloudbursts and more frequent lightning bolts: Experience reveals that a greater number of injuries can be linked to e.g. an increase in outdoor activity and more outdoor work in the building and construction industry.

- Milder winters with lower mortality and less damage:
  Milder winters may lead to fewer cold-related diseases and deaths and fewer injuries from ice and snow.

- Warmer summers and more precipitation enhance the risk of damp and mould:
  The combination of warmer summers and more humid autumns and winters, as well as a greater occurrence of cloudbursts, may enhance the risk of damage to buildings from damp and mould and lead to greater nuisance from house dust mites in homes. Damage from damp and mould in buildings can cause health problems and exacerbate asthma and hay fever. Respiratory irritation may increase the risk of respiratory infection. Furthermore, the existence of a greater number of house dust mites may lead to an increase in symptoms (asthma and hay fever) and intensified preventive treatment. Moreover more people are likely to develop allergies.

- A longer growing season will mean a greater risk of pollen allergies etc.:
  With a longer pollen season, higher pollen counts and more mould spores in outdoor air, many people will experience more symptoms (asthma and hay fever) and will need intensified preventive treatment. Furthermore, more people are likely to develop allergies (hay fever and asthma). Very allergenic pollen species, such as ragweed, have already found a habitat in Denmark.

- A warmer climate will mean less outdoor air pollution:
  A warmer climate could also mean there will be less need for heating and thus less pollution from heating sources.

6.1.3.12 Cross-sectoral areas

There will be direct physical climate change impacts in the three next cross-sectoral areas: emergency preparedness, insurance and spatial planning. These cross-sectoral areas, however, are characterised by providing services to the other areas that are especially vulnerable to changes in climate.

Spatial planning is about land use, which is extremely reliant on physical and climatic conditions, and, as such, spatial planning is vital in cross-sectoral preventive efforts within climate-change adaptation.

Emergency preparedness is about reducing the extent of the damage from extreme weather events, whereas the insurance industry provides compensation to those who have suffered damage. Both of these cross-sectoral areas are vital in mitigating the negative impacts of extreme weather events in the other sectors and industries.

6.1.3.12.1 *Emergency preparedness*

The scope of the assignments of the Danish fire and rescue service will rely widely on what other sectors do to prevent climate-change impacts, e.g. in terms of land use, the design and dimensioning of buildings, sewerage and roads, coastal management and coastal protection, and human behaviour. The task of the Danish fire and rescue service is therefore to manage other remaining risks for society.

Climate change is not expected directly to entail new tasks for the Danish fire and rescue service. A more likely trend seems to be the more frequent occurrence and greater intensity of events for which a response is required. The Danish fire and rescue service is responsible for limiting and mitigating damage and injury to people, property and the environment. These responsibilities are assessed on an ongoing basis against the need for developments in terms of equipment and manpower, including training.

6.1.3.12.2 *Important effects of climate change*

Climate change could demand a greater number, as well as more resource-demanding, emergency responses and assistance from municipal as well as national fire and rescue services.

Responses to storm and water damage include efforts to fortify and identify vulnerable buildings and infrastructure, prevent flooding with sand bags and pump water away from low-lying land areas. Other responses include assisting in establishing an emergency power supply. Moreover, an important task is to protect the environment when e.g. sewers are at risk of flowing over with sewage water, or when industrial areas have been flooded, tank systems have leaked, etc. In situations when flooding leads to contamination of drinking water, the Danish fire and rescue service can assist with the distribution of clean drinking water.

There is moreover a series of rescue assignments related to serious road accidents and other accidents involving personal injury, e.g. during storm or cloudburst events. In the event of particularly intense storms, snow storms and flooding, it may also be necessary to rescue and provide housing and food relief for those in need (e.g. when public transport, roads and bridges have been closed down and similar).

More frequent and longer-lasting periods with drought in summer may lead to greater risk of forest fires. This may result in a greater number of and more comprehensive tasks for the Danish fire and rescue service, including fire guarding, emergency drinking water supplies, fire extinction and fire-damping operations. Furthermore, an increase in maximum day temperatures during summer could lead to heatwaves of an intensity, scope and duration which may require the Danish fire and rescue service to assist in home-nursing efforts and in the public health emergency response.

Traditionally, the national fire and rescue service has been deployed abroad in the event of natural disasters, including, in particular, floods. The national fire and rescue service could therefore be assigned more international response tasks due to more extensive and more extreme climate-related events.
The government's report on emergency preparedness (May 2010) stressess that in future the Danish fire and rescue service must be prepared to mitigate the follow-on effects of several climate-related events such as hurricanes/storms, heavy precipitation, cloudbursts, storm surges, and extreme water levels. On the basis of experience from climate-related events since 2007, it is likely that equipment to tackle such events will continue to be in demand in the future. The size of the investments required depends e.g. on whether there are enough preventive measures in other sectors, as well as on future organisation and coordination of the rescue preparedness services at local and central-government levels. The closer the collaboration and coordination of equipment procurement and resource use across local and central-government levels, the better and more cost-effectively the effects of climate change can be managed.

6.1.3.12.3 *Insurance*

The most important impacts for the insurance industry are as follows:

- *Unpredictable weather reduces the possibility for addressing risks:*
  When weather and climate change impacts are less predictable, the insurance companies, in turn, have less possibilities for predicting damages and thus also for addressing the risks. As a consequence, the companies will try to minimise the uncertainty through measures like the ones mentioned below.

- *Higher reinsurance premiums:*
  Danish insurance companies are typically re-insured in large international reinsurance companies that also insure against financial losses from earthquakes, tropical storms and other large natural disasters, and to some extent also acts of terrorism. An increase in the intensity of cloudbursts and other extreme weather events in Denmark will lead to an increase in the costs of reinsurance. For example, the international reinsurance company Swiss Re has announced that the cloudburst that hit Copenhagen in July 2011 will lead to higher reinsurance premiums. These higher premiums will very likely trickle down to Danish insurance customers.

- *Targeted changes in premium and coverage:*
  For both citizens and enterprises, climate change will entail a risk of higher premiums, lower coverage or the introduction of special terms for taking out insurance. Differentiated premiums (so-called "micro tariffing") might be used more extensively, which means premiums will be determined based on where buildings are located (are they located where the risk flooding is particularly large or small?), the special characteristics and technical design of buildings, as well as their history of damages. This will entail that particularly exposed properties may be at greater risk (e.g. if the sewer system is under-dimensioned or if the property is in a low-lying area, and if potential damages cannot be prevented through ordinary preventive measures such as backflow blockers)

and therefore cannot be insured or can only be insured against paying extremely high insurance premiums. This, in turn, may affect loan opportunities. Owners of such properties will have a hard time selling their property. In the city of Odense, the local water utility company ultimately had to buy seven houses.

6.1.3.12.4 *Spatial planning*

Climate change is a challenge for both new and existing designation of land. The municipalities need the right knowledge to incorporate climate change in their spatial planning.

The municipal councils are responsible for spatial planning in municipalities. The municipal development plan is an overall plan for land use in the individual municipality. The municipal development plans must not conflict with overall planning and governmental interests. Furthermore, local development plans in the municipality must be in accordance with the overall municipal development plan and with any national planning directives that relate specifically to the area in question.

In addition to the legally binding provisions (national planning directives), the Minister for the Environment can influence the municipalities' planning through political statements in the national planning report, and through an report on national interests in municipal planning published every four years for use in the municipalities' revision of their municipal development plans.

Furthermore, the Minister for the Environment has specific powers to intervene in local planning to ensure national interests. These powers include, in particular, power to object to proposed municipal development plans on behalf of all central-government bodies whose interests are affected by the municipal plan (i.e. the concept of national interests). Changes in or new land use, for example in connection with adaptation to climate change, could fall under the concept of national interests.

Spatial planning is an effective instrument of control which can contribute to reducing or eliminating the negative effects, as well as exploiting the positive effects, of climate change in a number of sectors and industries. A bill was submitted on 29 March 2012 which will allow municipalities to incorporate climate considerations in local development plans, and guidelines on local development plans that incorporate climate change will be prepared in connection with the 2013 municipal planning process.

6.2 Vulnerability Assessment

Vulnerability assessments have been an element in the mapping of impacts of climate change in Denmark. To some extent, this area is dealt with in section 6.1.3.

6.3 Adaptation Measures

In March 2008, the Danish government launched the first Danish strategy for adaptation to a changing climate.

The strategy was followed by an action plan for a climate-proof Denmark[5], which was launched in December 2012 . The action plan is based on the notion that a responsible climate policy must do more than just work towards limiting climate change in the long term. It must also ensure the action necessary right now to adapt our society to a climate that is already changing.

The action plan[6] presented 64 new initiatives and gave at the same time an overview of initiatives already set in motion by the government to ensure that Denmark will become resilient to climate change.

All parts of society must contribute to climate change adaptation in Denmark. Dealing with the climate challenge requires collaboration between authorities, organisations, private enterprises and individuals, regardless of whether the project is maintenance of existing roads, coastal protection, construction, or investments in new infrastructure.

Climate change adaptation is first and foremost based on initiatives at local level and involves the local authorities, companies or individuals. The individual stakeholders know the local conditions best, and are consequently in the best position to make decisions on
adaptation.

Central government itself has a responsibility as the owner of infrastructure, buildings and land. However, the principle role for central government is to establish an appropriate framework for local climate change adaptation by, for example, adapting laws and regulations, but also by ensuring coordination and providing information. A solid framework for the efforts must support the specific parties involved, so that they can address the challenge in a socio-economically appropriate manner at the right time.

Climate change adaptation measures can also contribute to the development of new innovative solutions. The government will create the basis for continued technological and knowledge development, so that Denmark will have a strong position on the global market for climate change adaptation.

A series of initiatives and changes in relevant regulations have already been implemented. As an example, an amendment to the Planning Act now makes it possible for the municipalities to include climate change adaptation directly in the local development plans from 1 June 2012. The possibility for wastewater companies to invest in climate change adaptation has been clarified with an amendment in the Water Sector Act in spring 2012.

Central to climate change adaptation efforts is a strong interaction between state and municipalities. The government and the municipalities have agreed that the municipalities will increase investments in climate change adaptation and that all municipalities carry out a risk assessment and prepare municipal climate change adaptations plans.

From 2012-2014 the Minister for the Environment established a task force on climate change adaptation as a sounding board for the municipalities with regards to their preparation of municipal climate change adaptation plans. The objective of this task force was also to ensure up-to-date data and relevant knowledge on the Danish Portal for Climate Change Adaptation www.klimatilpasning.dk.

Implementation of the Danish Flood Risk Act (EU Floods Directive)

The Danish Flood Risk Act relates to the Directive 2007/60/EC of the European Union on the assessment and management of flood risks. The purpose of the Directive, implemented in Danish law by the Danish Flood Risk Act, is to identify flood risks and improve preparedness for future flood events and flood risk management.

In Denmark, 10 flood prone areas have been selected within the first step of the act. At 9 of the 10 flood prone areas, the source for flooding comes from the sea or from both the sea and rivers. Only one of the areas has an entirely fluvial risk source, and is therefore not part of this study.

Methodologically, it was decided that risk areas consist of coherent areas that contain a certain minimum real estate value potentially becoming flooded and a certain number of addresses. The thresholds were politically decided at 2 billion DKK (265 million €) and 500 addresses, respectively. One risk area was later appointed due to a potentially flood prone power plant and high-risk chemical plants.

In the second step of the act, maps were produced for 6 flooding scenarios, 2 hazard, 7 damage and 2 risk categories, respectively, in 5 grid cell sizes and yielded much information about the method performance. The maps, provided by the Danish Coastal Authority and the Nature Agency, were presented and discussed at municipal meetings in order to appropriately fit their needs and varying technical solutions; to incorporate prior knowledge about flood hazards and risks, and to merge the maps with existing data sets within the municipalities.

In the third step of the act, the invoved 22 Danish municipalities had to prepare their first flood risk management plan and started analysing the adverse flooding impact on the health of the civil society, the environment, cultural heritage, and economical activities through mitigation and adaptation measures. The preparation of risk management plans built on a multi-layer concept with emphasis on prevention–protection–preparedness and had to be based on the provided hazard, vulnerability and risk maps. The plans had to be coordinated with the abovementioned municipal climate adaptation plans and take into account floods related climate impacts.

The guidelines for preparing risk management plans, provided by the Danish Coastal Authority and the Nature Agency, suggest that risk management planning should emphasize on cross-coordination between actors in the municipality and across municipalities and river basins. In addition, the guidelines recommend the inclusion of civil society.

6.4 MONITORING AND EVALUATION FRAMEWORK

In the period February to August 2016, a working group with representatives from the Ministry of Environment and Food of Denmark, the Ministry of Energy, Utilities and Climate and the Ministry of Business and Growth carried out an evaluation of municipal climate change adaptation efforts.

Every municipality in Denmark has prepared a climate change adaptation plan, which mapped the risk of flooding, specified priorities and gave an overview of the efforts. 22 municipalities also had to prepare a risk management plan pursuant to the Danish Flood Risk Act, that relates to the EU Floods Directive.

Outcome of the evaluation of the municipal climate change adaptation efforts

The evaluation reveals that incorporation of climate change adaptation in municipal development planning has served as a basis for coordination of climate change adaptation efforts with other spatial planning efforts, and that it has provided a picture of local flood risks throughout Denmark.

The tool will therefore be useful for municipalities in their future planning and prevention of the consequences of cloudbursts and other sources of flooding.

The evaluation reveals discrepancies in the level of detail in the municipalities' climate change adaptation plans, as well as differences in the scope of the topics included in mapping. For example, many municipalities have not included flooding from watercourses and groundwater flooding in their risk mapping.

The evaluation analysed the financial aspects of, and experience from, co-financed projects. This analysis assessed that the co-financed projects budgeted and applied for during the period examined were, on average, almost four times cheaper to implement than traditional projects delivering the same level of service.

This shows that water utility companies can potentially reap substantial costs savings by choosing co-financed solutions.

Through agreements or through their ownership in the company, the municipalities can decide to raise the level of service without this burdening the financial framework of the wastewater companies, as they will receive a supplement to their financial framework, which will be approved by the Water Division.

Without municipal co-financing, increased investment in climate change adaptation will also not burden the municipalities finances.

This presents an incentive problem, which may lead to over-investment and, thus, failure to secure a socio-economically optimal level of investment.

6.5 Progress and outcomes of adaptation action

New governmental initiatives on coastal protection and erosion

In 2017, the Danish government decided to carry out a number of initiatives to support municipalities and property owners in establishing cost-effective and holistically planned flood and erosion protection. Several of the initiatives build on the work of a cross-ministerial committee set up at the beginning of 2017.

- Establishment of a new flood and erosion task force to serve for a three-year period and guide municipalities in the establishment of holistically planned solutions.
- Development of a central-government risk analysis tool, which will be based on previous events and guidance.
- Drawing-up of guidelines and examples on how and what data to use in local-government spatial planning and work on climate change adaptation.

- Establishment of a limit on case-processing times for appeals in coastal protection cases.
- Mapping of all dykes in order to give the emergency management authorities access to up-to-date knowledge about the height and strength of dykes so that the authorities have better opportunity to organize personnel and resources in connection with storm surges.
- Amendment of the Planning Act, so that municipalities can identify areas in their municipal development plans that are at risk of flooding and erosion and ensure that remediation measures are put in place when urban development is planned in these areas.
- Preparation of a revised climate scenario on the basis of the UN IPCC Fifth Assessment Report, as well as preparation of a climate atlas with data on temperature, precipitation, sea level, etc.
- Simpler and faster processing of coastal protection cases.
- Amended object clause in the Coastal Protection Act, which gives property owners greater freedom to choose methods of coastal protection, and preparation of guidelines for various methods of coastal protection.
- Preparation of guidance models to allocate costs across owners in large coastal protection projects.
- Guidelines for development projects in coastal areas.
- Fast-track case processing of appeals in coastal protection cases.
- Possibility to buy up homes repeatedly exposed to situations resulting in claims for compensation.
- Co-financing rules for local-government climate change adaptation projects will be addressed in discussions in spring 2018.

Further development of www.klimatilpasning.dk

The portal, www.klimatilpasning.dk contains news, concrete cases about climate change adaptation measures and many interactive tools. From the launching of the portal in 2012, a number of interactive tools can be used to assess risk from e.g. rising sea levels and to climate-proof buildings. The portal is aimed at municipalities, enterprises and individuals and is continuously developed e.g. with a great number of cases and results from concrete projects throughout the country.

6.6 Climate changes and adaptation measures in Greenland

Climate changes

Projections of future climate evolution using global and regional climate models[7] for Greenland towards the end of the century compared with 1986-2005 for the RCP8.5 IPCC scenario show general temperature increases of 5-7 °C which is significantly above the increase in mean global temperature. The warming at the east coast of Greenland is expected to be as high as 8-9 °C. The temperature increase is largest in winter, and there will be fewer extremely cold days. Simulations show general increases in precipitation of 50-60 percent; and in Northern Greenland locally up to 350 percent during winter in presently dry areas. The changes result in earlier snow melt and reduced ice cover, especially along the east coast.

DMI has in collaboration with the government of Greenland compiled a new data basis for the Greenland adaptation planning, providing information about future climate change in Greenland in the form of 66 climate indices (DMI Scientific Report 15-04), including reports for each of 6 municipalities. As an example, the length of the growing season in southern Greenland is projected to increase by almost two months from the current extent of about 100 days by the end of the century in the RCP8.5 scenario.

Adaptation measures

The Government of Greenland is initiating projects aimed at mainstreaming adaptation efforts in the management and development of various sectors. A series of assessments of how the public sector can promote adaptation to climate change was launched in 2011. The first assessment focus on 'Opportunities for climate change adaptation in the fisheries and hunting industry' (September 2012). The assessement is conducted on the basis of existing scientific assesments and local knowledge. The assessment report draws up a range of conlusions pointing to the fact that climate change has both direct and indirect consequences, often resulting in significant and unpredictable impacts on the fishing and hunting sector.

Efforts and actions towards the adaptation to climate change should therefore be viewed as a continuous process to be dealt with in close cooperation with the public administration, the scientific community and the industry and various local stakeholders.

The specific assessment of the fisheries and hunting sector addresses the fact that climate changes pose a wide range of challanges to the sector, but also new opportunities are identified. The assessments identify knowlegde gaps as more scientific knowledge about the expected impacts of climate change on natural ressources is needed in order to be able to develop national adaptation strategies and implement systematic approaches.

An integrated adaptation and mitigation assessment of the shipping sector was completed for political deliberation in 2015. Climate change potentially presents new economic opportunities for the shipping sector, most notably due to expected shortened shipping routes, longer navigable periods and increased access to oil and gas resources. However, there are also uncertainties and challenges connected to these opportunities. The assessment focuses on climate-change related challenges and opportunities for the shipping sector, including mitigation efforts.

The latest assessment 'Opportunities for climate change adaptation in the agricultural sector' was completed for political deliberation in June 2017. The assessment describes the consequences of climate change towards 2050 for the agricultural sector with a focus on how climate change can affect livestock, grazz production, crops and watering.

Furthermore, the Government of Greenland has engaged in an Arctic Council partnership with a view to producing an integrated regional assessment of climatic and antropogenic changes in the Arctic as a tool for future adaptation plans and actions. The Project "Adaptation Actions for a Changing Arctic" (AACA) draws on input from research and government institutions from Denmark, Greenland and Canada and focuses on the Baffin Bay/Davies Strait region.
In addition, a regional overview report was published in April 2017. It presents an overview of the findings of the AACA Baffin Bay / Davis Strait Region pilot study for policy-makers. The scientific report is expected to be finish in 2017.

The background for the Arctic Council decision to make such an integrated assessment is the observation that the Arctic has experienced substantial climate changes, and over the past decades Arctic climate change and the effects thereof have accelerated. This has led to profound effects and impacts on the physical, chemical and biological conditions of the Arctic and is expected to lead to fundamental changes across the Arctic.

To ensure that the public, the municipalities and the businesses know about the consequences of climate change, the government of Greenland administrates the website http://climategreenland.gl/. The aim of the website is to provide an overview of some of the ways in which Greenland is affected by a changing climate and how this is dealt with.

6.7 Climate changes and adaptation measures on the Faroe Islands

6.7.1 Projected climate changes in the Faroe Islands

The Faroe Islands have an extremely maritime climate, where the differences between summer and winter are relatively small. Projections with global climate models show the following general changes for the climate on the Faroe Islands in the period 2081-2100 in relation to the period 1986-2005:[8]

- A rise of about 3°C in annual mean temperature. There is only a slight difference in the temperature rise in summer and winter.
- A rise in winter precipitation of about 30% and a slight increase of 10% in summer.

6.7.2 Expected impacts of climate change

6.7.2.1 The marine environment

The ocean areas around the Faroe Islands are dominated by the North Atlantic Current that brings warm water flowing northeastwards until they meet colder waters from the East Icelandic Current north of the Faroes. This ensures that the upper layers in most of the Faroese economic zone including the shallow parts of the Faroe Plateau and the western banks are continually covered by fairly warm water. Any disruption in the balance between these two current systems may therefore have huge impacts on the temperature. With global warming, a general warming of the Northeast Atlantic is expected, but the North Atlantic Current is an integral part of the Atlantic Meridional Overturning Circulation (AMOC), which is projected to weaken during this century (IPCC, WGI, 2013). In many climate models, this weakening is projected to occur in the Labrador/Irminger seas system, but some CMIP5 models project weakening of the North Atlantic Current and cooling over Faroese ocean areas. In addition to this uncertainty, the strength of the Sub Polar Gyre circulation has a large effect on conditions in Faroese waters and the air temperature is very dependent on wind direction. The Faroese region is therefore especially sensitive to potential changes in the storm track.

Taking all these uncertainties into account, it is difficult to predict with any confidence how the physical conditions in Faroese waters will change, which makes it even more difficult to assess how marine ecosystems and fisheries will be affected. In the pelagic domain, recent years have shown large shifts in the migratory behaviour of economically important fish stocks and changes in the physical conditions are likely to have contributed to these. For the demersal fish stocks, their habitat is highly restricted geographically, which does not allow the stocks much room for relocation if conditions become unfavourable.

Summarizing, the physical conditions, the marine ecosystems, and fishing potential are likely to change in Faroese waters, but the severity and even directions of these changes are difficult to predict at the present level of knowledge.

6.7.2.2 Nature and landscape

The Faroese climate is highly dependent on the stability of ocean currents and wind directions and therefore difficult to predict. If there will be substantial warming, as projected by most climate models, substantial effects may be expected for the natural terrestrial vegetation. In high mountain regions, some alpine plant species are likely to disappear. In the lowlands, new species are likely to find favourable conditions, including highly invasive species. More generally, phenological changes are to be expected. Possible effects of other climatic factors, such as changing cloudiness, precipitation, or storm track, are at present difficult to assess.

6.7.3 Adaptation measures

So far no known adaptation measures have been implemented, nor planned on the Faroe Islands.

The University of the Faroe Islands is part of a project on climate change adaptation in regions in the Nordic countries as well as with regions in the United Kingdom and Ireland. The aim of the programme is to tackle Climate Change on local and regional levels through increasing public awareness and by using models of best practice to develop Climate Adaptation Plans for local authorities. The project will also develop a preparedness scale matrix for local authorities. See more in chaper 8.2.6.9.

6.8 ASSESSMENT OF THE SIGNIFICANCE OF CLIMATE CHANGE FOR THE WHOLE ARCTIC

The Arctic crysosphere (Snow and Ice) is a critically important component of the earth system, affecting the energy balance, atmospheric and ocean circulation, freshwater distribution and storage, sea level as well as the storage and release of large quantities of greenhouse gasses. Further, changes in the arctic cryosphere impact ecosystems, the economy, infrastructure, health, and indigenous and non-indigenous livelihoods, culture and identity.

In 2017 the Arctic Council and its subsidiary Arctic Monitoring and Assessment Program released a new synthesis and assessment of recent climate change and changes in Snow, Water, Ice and Permafrost in the Arctic;
Snow, Water, Ice and Permafrost in the Arctic 2017 – SWIPA 2017[9]. The SWIPA 2017 report is a follow the up to the first SWIPA[10] report issued in 2011 and the 2005 Arctic Climate Impact Assessment[11].

Focusing on arctic climate change and its impacts on the Arctic cryosphere since 2010 the SWIPA 2017 report documents a continuation of cryospheric trends consistent with the rapid warming of the Arctic, and finds that the trends are very likely to continue past mid century, with more frequent and stronger extremes and the passing of no-return tresholds.

The Arctic sea ice is undergoing a regime shift from multi-year ice to predominately first year ice and the loss of land-based ice –from mountain glaciers and ice caps – is expected to accelerate, and the report finds emerging impacts of Arctic change on mid-latitude weather/climate and global sea level rise.

The SWIPA 2017 work was chaired by the Kingdom of Denmark.

In parallel to the above mentioned assessment focusing on changes in the physical, chemical and biological environment 3 regional assessments on the socital effects of climate change and other major drivers of change in the Baffin Bay/Davis Strait[12] (see section 6.4), the Barents Sea Region[13], and the Chukchi Sea/Berring Sea/Beauford Sea[14] region respectively have been undertaken with an aim to inform adaptation actions.

Scientist and other experts from the realm have had leading roles in the above work.

Valuable contibutions to the understanding of Arctic climate change and effects thereof are based on long term observations and studies as well as other research efforts.

Since 1994 an integrated ecosystem based climate-effect measurement programme has been operating at the High Arctic research station Zackenberg in north-east Greenland. In 2007 the Zackenberg programme was complemented by a similar program at Kobbefjord close to Nuuk in south-west Greenland, and in 2013 the programme was extended to also include measurements at Arctic Station on Disko Island. The comprehensive cross-diciplinary programme – Greenland ecosystem Monitoring – creates long term dataseries of multiple aspects of ecosystem responses to climate variability and long term trends thus creating a basis for thorough multi-year analyses and targeted process studies.

The programme for Monitoring of the Greenland Ice Sheet (PROMICE) carried out by the National Geological Survey of Denmark and Greenland provides real time data measuerments from the marginal ice and has operated for more than 10 years.

A center for Ice and Climate was established in 2007 as part of the University of Copenhagen. Here research from among other things ice-core drillings has contributed significantly to knowledge of past and present climate dynamics and the dynamics of the Greenland Ice Sheet.

The Greenland Climate Research Centre (GCRC) is concerned with the expected impacts of climate change on Arctic marine, limnic and terrestrial environments and on Greenlandic society, including adaptation and prevention strategies. The centre was established in 2009.

A centre for the study of Permafrost, CENPERM, under the University of Copenhagen was established in 2012.

Major institutions in Arctic climate-related reseach and data gathering within the Kingdom of Denmark include: the Danish Meteorological Institute, the University of Copenhagen, the University of Aarhus, the University of Aalborg, the Danish Technical University, theUniversity of Southern Denmark, the National Geological Survey of Denmark and Greenland, the National Museum of Denmark, the Faroe Marine Research Institute, the Greenland Institute of Natural Resources and the Greenland Climate Research Centre.

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[1] Cappelen, 2017b
[2] Olesen et al. 2014: Fremtidige klimaforandringer i Danmark, DKC-rapport 14-06, DMI.

[3] http://en.klimatilpasning.dk/media/600858/130206_mapping_climate_change_final.pdf
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[12] AMAP, 2017: Adaptation Actions for a Changing Arctic Baffin Bay – Davis Strait Region. Arctic Monitoring and Assessment Program (AMAP), Oslo
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7 FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

7 Financial resources and transfer of technology

- including information under Articles 10 and 11 of the Kyoto Protocol

Contents

7.1 STRATEGIES FOR DANISH DEVELOPMENT ASSISTANCE AND CLIMATE CHANGE

Since 2012, the Danish policy towards development assistance and climate finance has been guided by various frameworks, namely the overall strategy ‘A Right to Better Life’, supplemented by ‘A Greener World for all: Strategic Framework for Natural Resources, Energy and Climate’ (2013) and ‘the Green Growth Guidance Note‘ (2014).

In January 2017, the Danish Government presented its future strategy for development cooperation and humanitarian action, ‘The World 2030‘. This new strategy specifically targets support to five Sustainable Development Goals: Goal No. 5 (gender equality), Goal No. 7 (sustainable energy), Goal No. 13 (climate), Goal No. 16 (peace, justice, institutions) and Goal No. 17 (partnerships).

Public support to developing countries for climate actions should comply with the 'Danida Aid Management Guidelines' and 'the Danish Finance Act'.

7.1.1 Danish climate finance

The public Danish support to climate relevant action in developing countries is provided through dedicated mechanisms, such “Climate envelope”, and as integrated element of other development cooperation and financing instruments and programmes. A significant part of the Danish climate finance is channelled through various international and multilateral development institutions, such as the World Bank, African Development Bank or UNDP, either as core funding or through special climate windows and programmes of these institutions. Likewise, Denmark provides parts of its climate financing through the operating entities of the financial mechanisms of UNFCCC – the Global Environmental Facility and the Green Climate Fund.

Denmark seeks to support both adaptation and mitigation related action with a view to contribute to sustainable development. Danish support to adaptation related activities and programmes address underlying causes of vulnerability, and contribute to building resilience against crises, natural disasters and the impacts of climate change. The support also assists developing countries in their efforts to integrate adaptation and emission reduction considerations in their national planning and policy preparation and implementation, including as part of supporting their Nationally Determined Contributions.

Through both multilateral and bilateral assistance, Denmark supports increased access to sustainable energy in developing countries, improvement in energy efficiency and improved access to climate-friendly technologies. This is done by strengthening the national and local knowledge and capacity, by supporting the policy development and implementation, and through support to investments in preparation and implementation of specific mitigation projects. Furthermore, Denmark offers technical assistance and advice on development of investment opportunities and by strengthening local businesses in developing countries.

The 'Climate Envelope' is an important part of Danish climate financing as a dedicated mechanism for supporting mitigation and adaptation activities in developing countries. The 'Climate Envelope' is programmed jointly by both the Danish Ministry of Foreign Affairs and the Danish Ministry of Energy, Utilities and

Climate. In the period 2013-2016, the finance commitments from the 'Climate Envelope' have on average constituted around DKK 400 million annually.

A significant part of the Danish climate engagements are targeting a range of priority partner countries, with whom Denmark has a long-term partnership for sustainable development. The Danish bilateral development assistance is decentralised to the Danish representations in the partner countries, which has the primary responsibility for the dialog with the respective partner countries and the related programming and management of the development cooperation. Denmark cooperates with national and local government authorities, international agencies, civil society organisations, private companies, research institutions and other relevant actors, and specific projects and programmes are identified and prepared in close collaboration with national partners.

Denmark is one of few developed countries that fulfil the UN goal of contributing a minimum of 0.7 percent of the gross national income to development assistance. About 30% of the total budget is channelled as core contributions to multilateral institutions, mainly the EU, the UN, the World Bank and the regional development banks that play important roles in the global climate finance landscape. Contributions to the core functions of the organisations are complemented by targeting thematic and regional initiatives, where Denmark has special interests, including to various climate relevant programmes and trust funds.

7.1.2 New and additional

According to the reporting requirements, Annex II parties shall clarify how they have determined if resources are new and additional. For the purpose of this report, newly committed (for reporting on commitments) or disbursed (for reporting of disbursements) finance for climate change adaptation or mitigation activities within the reporting period and was not reported to UNFCCC in the previous report are considered new and additional. This definition allows a transparent, comprehensive and comparable reporting of climate finance provided to developing countries across the years.

Denmark sees the achievement of climate change and the broader sustainable development goals as closely linked and strongly interdependent, and seeks to identify and support activities in developing countries that address multiple objectives as identified by these countries, including strong co-benefits between climate and broader sustainable development objectives.

7.2 METHODOLOGY FOR REPORTING

This report includes figures on both commitments and disbursements of climate finance. It is important to note that commitments and disbursements describe two different phases in the deployment of climate finance. Climate finance is committed to a specific project, programme or institution when it is finally approved by the relevant Danish authority and an agreement or similar document signed with the recipient country or organisation. Finance is disbursed when an actual transfer has taken place to an account of the recipient country or organisation. In some cases commitment and disbursement takes place in the same year. In other cases, disbursements will take place over a number of years following the commitment.

Information on commitments and disbursements 2013-2016 is contained in Annex D1 in the Common Tabular Format (CTF) for biennial reports. The information on the disbursements in 2015 and 2016 is also contained in Annex F as Tables 7, 7(a) and 7(b) of the CTF reproduced in Chapter VIII of Denmark's Third Biennial Report under the UNFCCC (BR3).

Denmark has decided to report financial figures using the same CTF format as in the Third Biennial Report. This makes it possible to compare figures with First Biennial Report (BR1) covering 2011-2012 and Second Biennial Report (BR2) covering 2013-2014. Denmark's method for reporting to the UNFCCC was changed between BR1 and BR2, as BR1 reported on commitments while BR2 reported on disbursements. By providing data on both commitments and disbursements in this report, it is possible to compare with older reports using both reporting methods.

In the following, the methods behind tracking and reporting bilateral, multilateral and mobilised private climate finance are explained.

7.2.1 Bilateral climate finance

For bilateral public climate finance, Denmark uses the OECD DAC CRS database with its Rio Markers as basis for reporting on climate change relevant activities. The Rio Markers on adaptation and mitigation are policy markers that indicate policy objectives in relation to each project/programme that is reported to OECD's 'Creditor Reporting System (CRS)'. The markers are assigned based on well-defined guidelines and technical eligibility criteria agreed within OECD DAC.

The guidelines for Rio markers are part of the general 'Official Development Aid' statistics guidelines[1], which provide concrete examples of Rio-marking (Annex 18, Rio Markers). The Rio-marker framework is a useful result of the OECD initiatives to improve/develop the DAC reporting methodology related to transparency on public and private climate finance. Denmark has been an active member of an OECD working group refining and improving the Rio marker system to better serve the purpose of being used as the basis for climate finance reporting to UNFCCC.

Rio markers are applied to all bilateral support to developing countries, except general budget support, imputed student costs, debt relief, administrative costs, development awareness-raising, and refugee reception in donor countries. For a precise definition of OECD DAC Rio markers see the *'Converged Statistical Reporting Directives for the Creditor Reporting System (CRS)'* and *'the Annual DAC Questionnaire'* (including Annex 18 therein).

All Danish support to developing countries is screened and marked with Rio markers to establish whether the project is targeting adaptation and/or mitigation as a "principal objective", a "significant objective" or not targeting. The values of a project are attributed according to the extent to which the themes are explicitly addressed at the level of problem analysis (context); objectives and results; and activities as defined in the eligibility criteria.

The climate relevant contribution of a specific project or programme is quantified based on the adaptation and mitigation markers. If a project or programme is marked with Rio-marker 1 ("Significant") for adaptation and/or mitigation, 50% of the project is reported as climate relevant finance. If a project or programme is marked with Rio-marker 2 ("Principal"), 100% of the budget is reported as climate relevant. In order to avoid double-counting, Denmark ensures that in cases where projects or programmes are marked for both adaptation and mitigation, the total amount of climate relevance finance reported does not exceed the highest marking given.

The types of climate specific support that are reported are “Mitigation”, “Adaptation”, “Cross-cutting” and “Other”. The applied Rio-markers are used to distinguish between the different support types. Contributions relating to programmes, projects and activities that are assigned with a positive Rio-marker for either mitigation or adaptation are reported under the relevant heading. Definitions of mitigation and adaptation are in accordance with the definitions by OECD DAC. Detailed information is provided in Annex 18 of the OECD DAC reporting directives. Mitigation seeks to limit climate change by reducing the emissions of GHGs or by enhancing sink opportunities. Adaptation aims to lessen the adverse impacts of climate change. Contributions to programmes, projects and activities assigned with a positive Rio-marker for both mitigation and adaptation are reported as cross-cutting.

The Danish MFA has put in place a system of external quality assurance of all Rio markers in the project portfolio, which is done before submitting to the OECD CRS database and the use of the database for reporting UNFCCC. Furthermore, the MFA has internally made an effort to further develop its methods and understanding on the handling of reporting to UNFCCC, including by addressing the comments and recommendation by the UNFCCC Expert Review Team to BR2 and NC6. Among the changes and improvements in the methods can be mentioned:

- More detailed information is provided for bilateral climate projects, including information on project titles and identification number in the CRS. This number allows potential users of the report to get more detailed project level information from the open-access OECD DAC CRS database.
- Reporting on multilateral climate-specific funding has been improved to include climate specific funding going through multilateral institutions. Such support to multilateral climate funds is now included as climate-specific finance.
- Analysing the climate part of major Danish public support to major NGO framework programmes.

7.2.2 Multilateral climate finance

Multilateral climate finance is in the CTF divided into core funding to institutions and climate-specific funding. Core funding is by Denmark identified as funding to selected institutions that are marked as “Core contributions to multilateral institutions" in CRS++ statistical reporting to OECD DAC. Core funding for multilateral institutions is *not* marked with Rio markers in CRS by member states. The numbers reported as core funding to multilateral institutions in CTF Table 7 are the actual amounts of disbursed annual contributions to the organisations.

Many of these institutions track the climate relevant proportion of the projects they support, and report data on these to OECD DAC. It is thus possible to get data on climate-relevant outflows from the main multilateral institutions. But in accordance with the UNFCCC reporting guidelines, Denmark has simply reported its annual core contributions to the organisations, and has not included information on possible climate relevant shares in the CTF table 7. This information is available from the organisations or from OECD DAC.

With regard to CTF Tables 7 and 7(a), Denmark reports on core/general finance and climate-specific finance in a mutually exclusive way:

- Core contributions to '*Multilateral financial institutions, institutions, including regional development banks and 'Specialised United Nations bodies*' are reported as such, including core funding for the World Bank, African Development Bank, Asian Development Bank, UNDP and UNEP. This also includes funding to the Global Environment Facility.

  In addition, Denmark reports on core funding to selected multilateral institutions whose portfolios may include climate related activities, including: CGIAR, the International Fund for Agricultural Development (IFAD), Nordic Development Fund, UN International Strategy for Disaster Reduction, United Nations Industrial Development Organisation and World Food Programme.

- Contributions to '*Multilateral climate change funds*' are reported as climate-specific, including funding to the UNFCCC, the Green Climate Fund, the Least Developed Countries Fund and the Multilateral Fund for the Implementation of the Montreal Protocol.

  In 2015 and 2016, Denmark also reports on climate-specific funding channelled through the Global Green Growth Institute (GGGI), the International Bank for Reconstruction and Development, the Inter-American Development Bank, the International Energy Agency, United Nations Children's Fund (UNICEF), Food and Agricultural Organisation (FAO), United Nations Office for Project Services and through other multilateral organisations. These climate specific contributions are to be distinguished from core contributions to the same organisations that are reported as core contributions as mentioned above.

Climate-specific finance through multilateral institutions is identified, except for the core finance to multilateral climate funds, based on an application of Rio markers, in a method identical to the one used for bilateral climate-specific finance, as also described above. Denmark separates climate-specific bilateral and multilateral funding based on OECD DAC channel codes. The multilateral funds are reported in CTF Table 7(a) and the bilateral funds are reported in CTF Table 7(b).

Reporting on climate finance through core contributions to multilateral organisations is a major challenge for Denmark and other donor countries. Therefore, Denmark values the joint climate finance tracking methodology used by the Multilateral Development Banks (MDBs). Such a methodology is enhancing accountability with regard to climate finance commitments, and to monitor trends and progress in climate related-investment. This is well described in their annual reports ('*Joint Report on Multilateral Development Banks' Climate Finance*'). Denmark will actively engage to seek further improvement of the reporting methodologies for multilateral climate finance flows to allow for better reporting of these to UNFCCC.

7.2.3 Private climate finance

For the first time, Denmark did in 2015 and 2016 apply Rio markers to private climate finance mobilised by public finance through the Danish development financing institution, the Investment Fund for Developing Countries (IFU). IFU both provides equity capital to climate relevant investments in developing countries using its own resources and it manages a number of investment vehicles that also involves private investors, such as the Danish Climate Investment Fund (DCIF). DCIF may invest in all developing countries offering venture capital and advice to climate investors. The DCIF is an innovative collective investment vehicle that uses public funds provided by the Danish government and IFU to mobilize further financing from Danish pension funds and other private investors have contributed the major part.

IFU submits an annual report to the Danish MFA with information about climate relevant investments, since 2015 including private climate-finance mobilised.

In addition to the support provided by the IFU, Denmark supports private sector climate projects through the Danida Business Finance and Danida Market Development Partnerships. Both programmes provide support to projects focused on sustainable development, including energy efficiency, resource use, environment impacts and climate. A number of climate related activities have been supported, in particular investments in renewable energy.

7.2.4 Methodological differences from BR2

The methodology used for calculating Danish climate finance for 2015 and 2016 is generally the same as the one that was used in BR2 for 2013 and 2014. Some minor differences are noted between the two reports, specifically:

- Projects receiving a score of "Principal" in one of the Rio markers in pursuit of the UNFCCC, and a score of "Significant" in the other were in BR2 for the years 2013 and 2014 classified as "Cross-cutting". For the years 2015 and 2016, such projects have been classified as 100% in pursuit of the Rio marker scored as "Principal" (either Mitigation or Adaptation).

- Core funding for all multilateral climate funds were in BR2 for the years 2013 and 2014 reported in the Core/general column in CTF Tables 7 and 7(a). For 2015 and 2016, core finance for all multilateral climate funds other than for the Global Environment Facility, and core finance for the Global Green Growth Institute has been classified as climate-specific.

- Core funding is for 2015 and 2016 reported for a number of additional institutions, whose project portfolios may include some amount of climate finance. The institutions for which core finance was not reported in BR2, but is reported for 2015 and 2016 include CGIAR, the International Fund for Agricultural Development (IFAD), the Multilateral Fund for the Implementation of the Montreal Protocol, Nordic Development Fund (NDF), and UN International Strategy for Disaster Reduction (ISDR).

7.2.5 Final remarks

Denmark provides the information in CTF Tables 7, 7(a) and 7(b) in Danish Kroner and United States Dollars. Denmark is using the currency exchange of the OECD DAC statistical table: Annual Exchange Rates for DAC Countries from 1960 to 2016.

Information on individual Danish development projects is publicly available in Danida's OpenAid database (*http://openaid.um.dk*), where updated disbursements to individual projects and total sums for disbursements to countries, sectors and particular implementing organisations can be found. This testifies to the Danish MFA's implementation of the International Aid Transparency Initiative (IATI).

Denmark, as an EU Member State, also reports under the EU Monitoring Mechanism (MMR), which provides annual reporting of up-to-date information on financial support, capacity building and technology transfer activities to developing countries based on the best data available. This updated reporting mechanism was initiated in 2013. To the extent possible, Denmark follows the recommendations made by the European Commission to allow comparable reporting among Member States of the EU.

7.3 Overview of Danish climate finance from 2013 to 2016

This section presents an overview of the Danish climate finance reported to UNFCCC. The overview includes a breakdown by implementation channel (multilateral, bilateral etc.), an overview of recipient countries, mitigation and adaptation shares, bilateral and multilateral channels as well as support to LDC countries.

7.3.1 Danish climate finance reported 2013 to 2016 - disbursements

In Table 7.1 below there is an overview of Danish climate-specific finance between 2013 and 2016 for disbursements and commitments. Denmark's core contributions to multilateral institutions are not included in Table 7.1 (reported separately under the 'Core/general' column in CTF Table 7 as required by the UNFCCC). The table shows how Danish climate finance disbursements and commitments have been distributed between mitigation, adaptation and cross-cutting based on Rio markers.

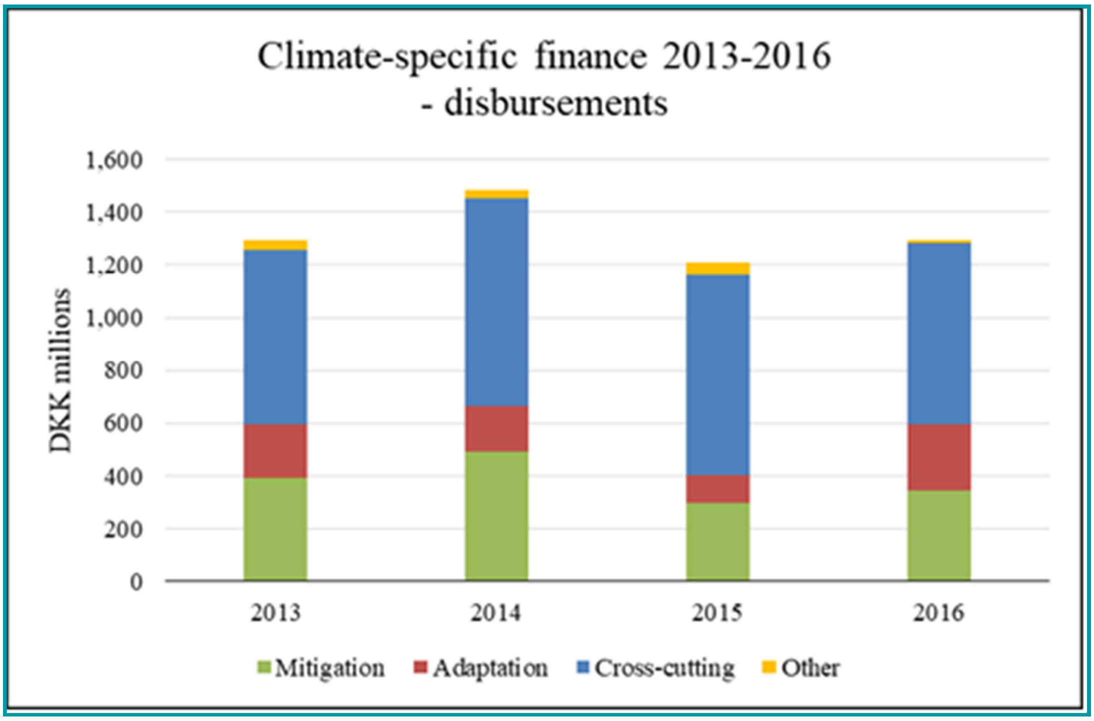
Figure 7.1 shows how Danish climate finance disbursements are distributed between mitigation, adaptation and cross-cutting in the period from 2013 to 2016. The support has, on average, targeted 29% on mitigation, 14% on adaptation and 55% on cross-cutting projects.

It should be noted that commitments may fluctuate significantly from year to year depending on the specific types of commitments made in the specific years. Thus, the commitments were very high in 2013 and 2014 due to a number of multi-year country support programmes being approved these years.

TABLE 7.1: DANISH CLIMATE FINANCE 2013-2016. FIGURES FOR 2013 AND 2014 ARE CALCULATED USING A METHOD SIMILAR TO THE METHOD USED FOR 2015 AND 2016 IN BR3. THESE MIGHT THEREFORE DIFFER FROM FIGURES REPORTED IN BR2.

Danish climate-specific finance (DKK millions)		**2013**	**2014**	**2015**	**2016**	**Average 2013-2016**
Commit-ments	Mitigation	229	471	192	259	288
	Adaptation	81	0	89	394	141
	Cross-cutting	1,336	1,257	793	203	897
	Other	0	0	0	2	0
	Total climate-specific	**1,646**	**1,728**	**1,074**	**857**	**1,326**
Disburse-ments	Mitigation	392	492	296	346	382
	Adaptation	202	171	107	248	182
	Cross-cutting	665	788	762	691	726
	Other	33	33	43	7	29
	Total climate-specific	**1,292**	**1,484**	**1,208**	**1,293**	**1,319**

FIGURE 7.1: DISBURSEMENTS OF CLIMATE FINANCE FROM DENMARK BETWEEN 2013 AND 2016. VISUAL REPRESENTATION OF THE NUMBERS FOUND IN TABLE 7.1.



The cross-cutting category can be split equally into mitigation and adaptation with the result shown in Table 7.2[2].

TABLE 7.2: DANISH CLIMATE FINANCE 2013-2016. AS TABLE 7.1 BUT WITH THE CROSS-CUTTING CATEGORY EQUALLY SPLIT INTO MITIGATION AND ADAPTATION.

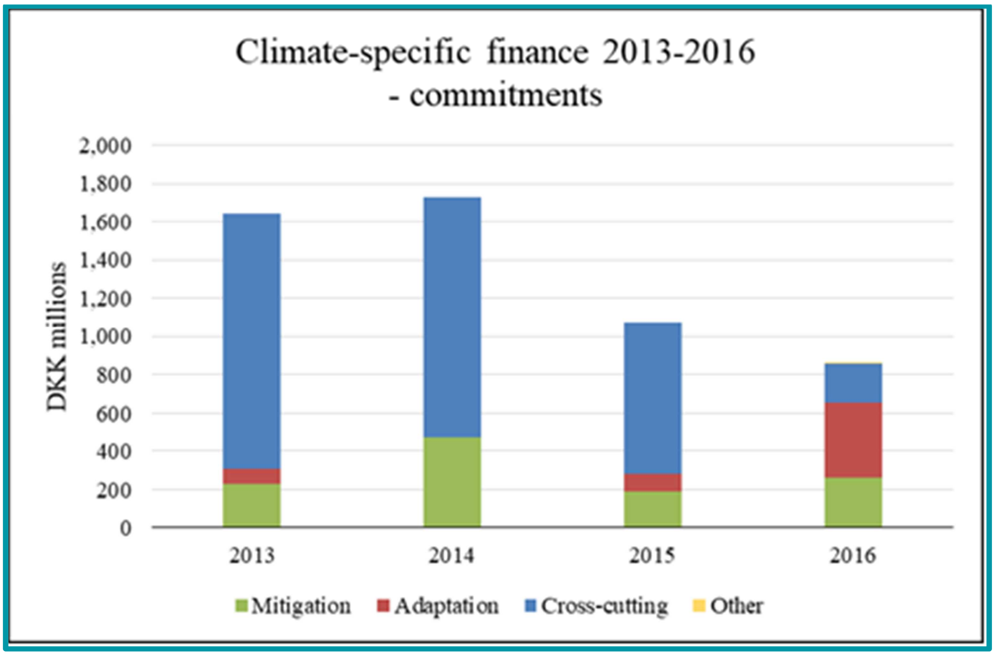
Danish climate-specific finance (DKK millions) *Cross-cutting split between mitigation and adaptation*		**2013**	**2014**	**2015**	**2016**	**Average 2013-2016**
Commit-ments	Mitigation	897	1,099	589	360	736
	Adaptation	749	629	486	495	590
	Other	0	0	0	2	0
	Total climate-specific	**1,646**	**1,728**	**1,074**	**857**	**1,326**
Disburse-ments	Mitigation	724	886	677	692	745
	Adaptation	535	565	487	594	545
	Other	33	33	43	7	29
	Total climate-specific	**1,292**	**1,484**	**1,208**	**1,293**	**1,319**

With this method, Danish climate finance disbursements in the period from 2013 to 2016 has, on average, spent 56% on mitigation and 41% on adaptation.

7.3.2 Danish Climate Finance Reported to the UNFCCC (2013 to 2016) - commitments

Figure 7.2 shows Danish climate finance commitments between 2013 and 2016. On average, Denmark has committed DKK 1.33 billion annually, amounting to 8% of total Danish ODA commitments.

FIGURE 7.2: COMMITMENTS OF CLIMATE FINANCE FROM DENMARK BETWEEN 2013 AND 2016. VISUAL REPRESENTATION OF THE NUMBERS FOUND IN TABLE 7.2.



7.3.3 Danish climate finance to multilaterals channels (2013 to 2016)

Core funding to multilateral institutions is reported separately under the 'Core/general' column in Table 7 as required by the UNFCCC reporting guidelines. These core contributions are not included in the summary tables above.

Many multilateral institutions annually report their climate-relevant outflows to OECD, and the percentage of their total portfolios that can be considered as climate-relevant financing. Based on this information it is possible to estimate the so-called imputed shares of the core contributions to these multilaterals that may be considered as climate relevant.

Table 7.3 below provides an overview of Danish core contributions (disbursements) to a range of multilateral institutions and the corresponding imputed climate relevant shares[3].

TABLE 7.3: BREAKDOWN OF MULTILATERAL CORE FUNDING BETWEEN 2013 AND 2016 INCLUDED IN THE DANISH REPORTING TO THE UNFCCC AND THE CORRESPONDING CLIMATE RELEVANT PART OF THESE CONTRIBUTIONS CALCULATED BASED ON THE OECD IMPUTED SHARE METHOD . FIGURES FOR 2013 AND 2014 ARE CALCULATED USING A METHOD SIMILAR TO THE METHOD USED FOR 2015 AND 2016 IN BR3. THESE MIGHT THEREFORE DIFFER FROM FIGURES REPORTED IN BR2*.

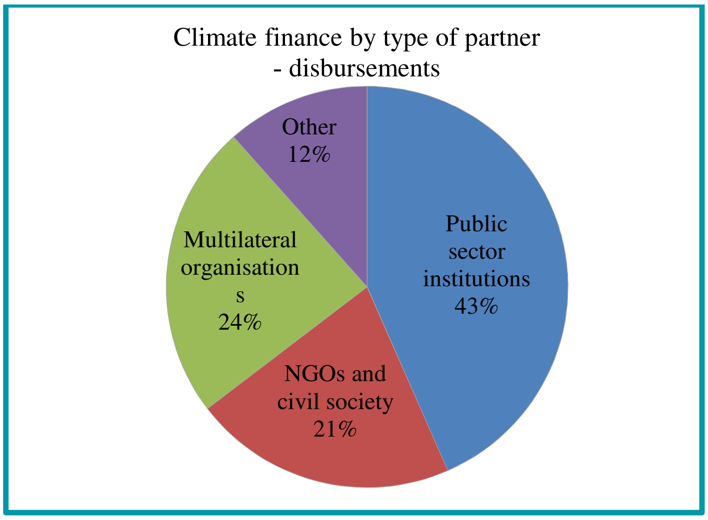
Core funding to multilateral institutions **Imputed method** (DKK million - **Disbursements**)	**2013**		**2014**		**2015**		**2016**	
	Core contribution reported	Imputed climate relevant share	Core contribution reported	Imputed Climate relevant share	Core contribution reported	Imputed climate relevant share	Core contribution reported	Imputed climate relevant share
Multilateral climate change funds	157	*127*	242	*202*	200	*170*	194	*165*
Multilateral financial institutions	936	*196*	629	*134*	1,034	*205*	1,107	*209*
Specialised United Nations bodies	552	*0*	625	*20*	619	*20*	434	*0*
Total	**1,645**	***323***	**1,495**	***355***	**1,853**	***395***	**1,736**	***374***

7.3.4 Climate Finance by type of partner

Figure 7.3 below illustrates the breakdown of Danish climate finance by type of direct partner. The categories are based on information available in CRS, and include climate specific contributions channelled through multilateral institutions bilateral grants to government institutions in partner countries, and NGO-managed funds. It does, however, not include core contributions to multilateral organisations neither in full nor as imputed climate-relevant shares.

As shown in Figure 7.3, bilateral public sector institutions (43%) are the primary partners for Danish climate finance, accounting for about twice as much of the climate finance as multilateral organisations (24%) and NGOs (21%).

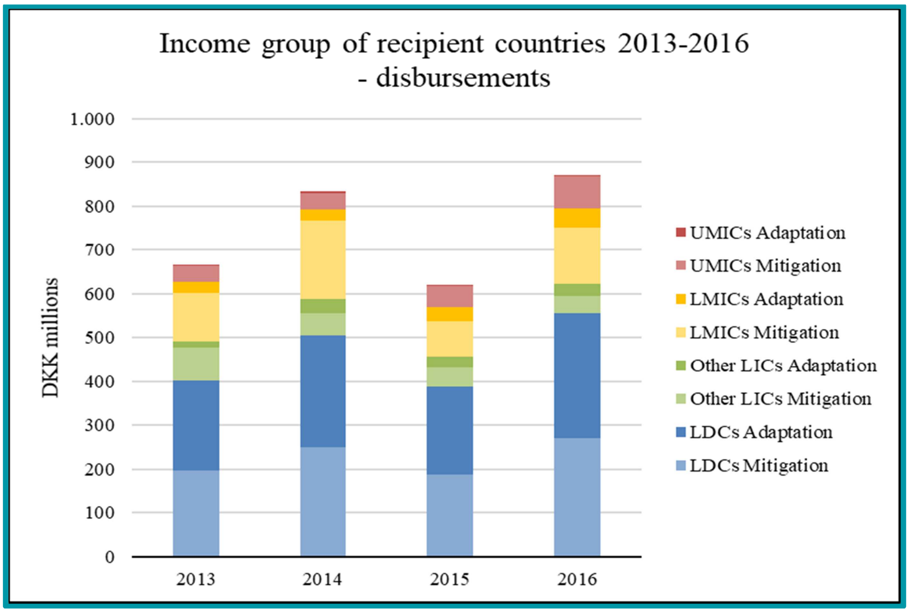
FIGURE 7.3: DANISH CLIMATE FINANCE DISBURSEMENTS 2013-2016 BY TYPE OF PARTNERS. CONTRIBUTION TO MULTILATERAL CORE FUNDING IS NOT INCLUDED.



7.3.5 Breakdown by Income Groups and Danida Priority Countries

Based on the project information available in OECD CRS, it is possible to categorise Danish climate finance according to recipient country income groups. This is illustrated in Figure 7.4 below, which shows how Danish climate finance disbursed between 2013 and 2016 is distributed between income groups used by the OECD-DAC (LDC: Least Developed Countries; Other LICs: Other Low Income Countries; LMICs: Lower Middle Income Countries; and UMICs: Upper Middle Income Countries). The figure excludes the 51% of funding categorised as "*Unallocated*" (e.g. spent by means of framework agreements with NGOs or universities or programmes and contributions to multilateral organisations or targeting multiple countries).

FIGURE 7.4: BILATERAL COUNTRY SPECIFIC DANISH CLIMATE FINANCE DISBURSEMENTS 2013-2016 DISTRIBUTED BETWEEN DIFFERENT INCOME GROUPS OF RECIPIENT COUNTRIES.



* Cross-cutting climate finance has in the figure been divided evenly between adaptation and mitigation.

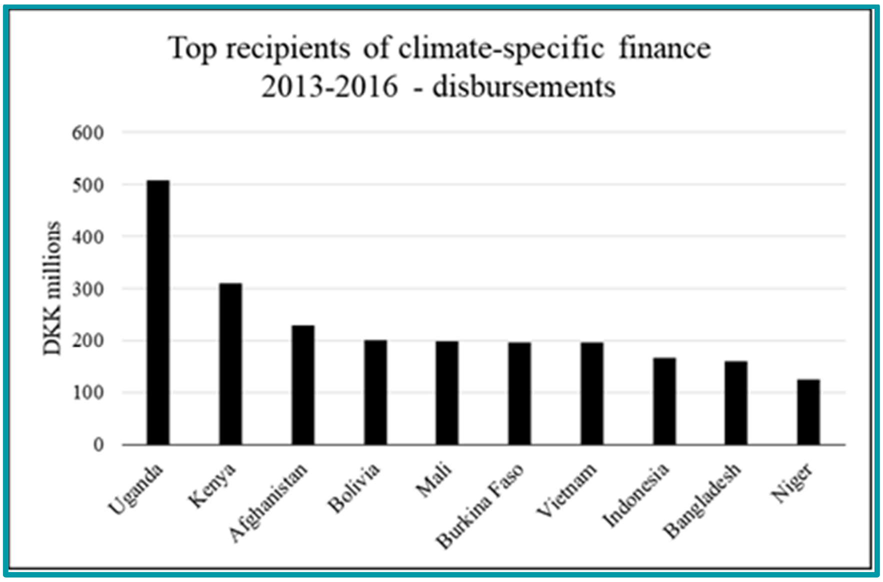
The least developed countries, LDCs, received more than 60% of bilateral country specific-climate finance from Denmark between 2013 and 2016.

Between 2013 and 2016, the climate finance to LDCs was evenly distributed between adaptation and mitigation while climate finance to middle income countries has a stronger focus on mitigation.

7.3.6 Allocation of Climate Finance to Danida Priority Countries

Figure 7.5 below shows disbursements of Danish climate finance between 2013 and 2016, to the top ten recipients. As indicated in Figure 7.5, the amount of climate finance varies a lot between the countries, but countries in South Asia, Southeast Asia and Africa are well represented.

FIGURE 7.5: TOP TEN RECIPIENT COUNTRIES OF CLIMATE FINANCE DISBURSEMENTS FROM DENMARK BETWEEN 2013 AND 2016.



7.4 TECHNOLOGY TRANSFER AND CAPACITY BUILDING

7.4.1 Introduction

Denmark does not have a dedicated system for tracking capacity building and technology transfer elements of its climate relevant support to developing countries. However, most climate support does have a capacity element and many projects and programmes also have elements of technology transfer.

The projects mentioned below are examples of how Denmark is practicing an integrated approach to capacity building and technology transfer as part of its overall climate support portfolio.

Danish support to capacity building in relation to implementation of the UNFCCC includes a broad spectrum of activities as capacity building activities are integral parts of most project activities. Denmark aims to ensure that ‘capacity building support’ provided to non-Annex I Parties reflects their priorities and needs through effective development cooperation.

Danish support to technology transfer comprises transfer of both “soft” and “hard” technology. The extent of this technology transfer is significant and cannot be clearly separated from other activities in Danish development cooperation, as well as there is often an unclear distinction between transfer of "soft" and "hard" technology. Examples of Danish-supported bilateral activities leading to technology transfer are e.g. the Danida Business Finance programme or the Danish sector programme supporting the energy sector. In the next section a number of concrete programmes are presented.

In Annex D2, descriptions in tabular format of a few selected programmes/projects to advance and/or finance transfer of technologies to other countries are given.

An overview of selected projects is set out in CTF Tables 8 and 9 in relation to country level ‘technology development and transfer support’ and ‘capacity building support’ (see Annex F, Chapter VIII).

7.4.2 Examples of projects with technology and capacity building elements

7.4.2.1 Climate change adaptation in Bangladesh

Denmark supports a number of climate change adaptation projects in Bangladesh focusing on adaptation of rural infrastructure to the impacts of climate change. The support includes piloting local level participatory adaptation planning and construction of more climate resilient local infrastructure in the fragile coastal zone. Another project supports upgrading, constructing and maintaining of climate resilient and sustainable rural roads connecting cyclone shelters also in the coastal zone. This project aims at building capacity and test new methods and ideas for more general uptake by the Local Government Engineering Department.

7.4.2.2 Energy efficiency in industry in Bangladesh

Through the Nordic Chamber of Commerce and Industry Denmark has supported piloting of energy efficiency audits and implementation of energy efficiency measures and technologies in a number of private sector companies in various sectors. The project has built capacity among private energy auditors and strengthened the local market for their services. Further, it has supported capacity building and training of energy managers and piloting of the introduction of energy saving technologies and processes in more than 50 companies.

7.4.2.3 Least Developed Countries Fund

Denmark has supported the Least Developed Countries Fund (LDCF) since it was conceived. The LDCF is a key mechanism for supporting, in particular, LDCs efforts to initiate national adaptation planning and implementation as an integrated part of the national, sectoral and local level development planning. Capacity building of national and local authorities is an important element of the support provided by the LDCF financed projects, including the support to introducing good practices and relevant climate-smart technologies.

7.4.2.4 Adaptation and building climate change resilience in Mozambique

Denmark has supported programmes for adaptation and building climate change resilience in Mozambique (between 2011 and 2016) in collaboration with the central government, municipalities, and civil society organisations. It strengthens the capacity of the partners to coordinate and carry out their normative mandates and mainstreams climate relevant activities in other sectors at provincial and municipal level.

At municipal level the support has included strengthening the capacities of the country's new municipalities for addressing management, investments, urban planning and environment. That includes climate change resilience and mainstreaming of climate change concerns into all relevant aspects of municipal planning and development. Building municipal climate change resilience is critical in Mozambique, given the projected human and economic losses due to unaddressed effects of climate change within urban areas, and the accelerating rate of urbanisation.

7.4.2.5 Greening of Agricultural Transformation in Ethiopia (GATE) thematic programme

Denmark supports the thematic programme 'Greening of Agricultural Transformation in Ethiopia (GATE)' with its first phase 2014-2017. The programme is designed to i) accelerate a ”green” transformation of the agricultural sector with a focus on the Ethiopian small-holder farmers and ii) gather speed to the mainstreaming and implementation of Ethiopian climate resilient green economy initiatives within agriculture and forestry.

The project works through an autonomous entity accountable to the Ministry of Agriculture, the Agricultural Transformation Agency that addresses the need for improving the understanding of and building of capacity to mainstream Climate Smart Agriculture across sectors. The focus is directed towards leaders in relevant ministries, departments, and regions as well as civil society and the private sector.

7.4.2.6 The Climate Technology Centre and Network (CTCN)

The Danish government supports, the Climate Technology Centre and Network (CTCN).The CTCN assists developing country Parties at their request, building or strengthening their capacity to prepare and implement technology projects that span the technology transfer continuum. The CTCN supports public and private sector action on mitigation and adaptation, enhancing low emissions and climate-resilient development in a manner consistent with the capabilities and priorities of countries. CTCN is active in the Paris Committee on Capacity Building, sharing experience in developing in-country capacity and operating the web portal, www.ctc-n.org that provide access to over 14,600 curated technology publications, webinars and case studies. The Centre hosts an innovation-focused meeting of the global research and development community, and cooperates with the GCF to advance solutions that address challenges early in the technology cycle.

7.4.2.7 UNEP-DTU partnership

The UNEP DTU Partnership (UDP) is an international research and advisory institution on energy, climate and sustainable development that has received Danish Government core funding since it was established in 1990. The UDP supports UN Environment in facilitating a shift towards cleaner and more efficient energy systems and support more climate resilient sustainable development in developing countries through internationally leading research, policy analysis and capacity development. As a UN Environment Collaborating Centre, UDP specifically supports the planning and implementation of UN Environment's Programme of Work and Medium Term Strategy. The Copenhagen Centre on Energy Efficiency, which is one of the thematic programmes within UDP, also functions as an Energy Efficiency-Hub for SEforALL.

Focus in all UDPs activities is on capacity building and technology transfer, and includes;

- Technology Transfer Partnerships for SDG and Climate Action,
- Strengthening markets and value chains for renewable energy in NDCs,
- Scalable and replicable models for private sector adaptation and mitigation action,
- Transparency of NDC and SDG actions, and
- Emissions and adaptation gap reports.

7.4.2.8 Promotion of Sustainable Natural Resource Management & Climate Change in Bolivia

The programme supports: i) Improved forest management and livelihood in national parks and forestry areas, ii) Improved energy efficiency, use of renewable energy and cleaner technologies and iii) Climate change mitigation and adaptation. The programme supports capacity building among local level actors and institutions on territorial planning and sustainable production of forest products for indigenous peoples contributing to climate change mitigation and ecosystems preservation. Further, the programme supports capacity building and technology transfer in energy efficiency and renewable energy. The later has included the construction fo a large scale wind-farm connected to the grid.

Finally, the programme has supported Bolivia in developing its Joint Mechanism of Mitigation and Adaptation for the Integral and Sustainable Management of Forests and Mother Earth.

7.4.2.9 Promotion of green technologies in Strategic Sector Cooperation with Kenya

Danida has supported management and reforms of Kenya's natural capital base especially in the sectors of water, environment and agriculture since the early days of engagement with Kenya. Partnering directly with the Government, this support has brought forward development of relevant sectoral policies, institutional and capacity building, in addition to facilitating community-driven environmental management and advocacy initiatives. The programme has supported the demand from community level for technical services from both public and private service providers. Further, Danida has supported the development of Kenya's National Climate Change Action

Plan (2013-2017) and activities to enhance private sector and community engagement in climate interventions through the use of technology innovation to reduce vulnerability to climate change and contribute to a low carbon development path.

Furthermore, Denmark has since 2012 supported "Improving Community Resilience and Rangeland Management (Northern Rangelands Trust – NRT). This programme seeks to enhance pastoral livelihoods in the harsh ASAL (arid and semi-arid lands) in Northern Kenya. It addressed the key challenges that undermine the resilience of marginalised and vulnerable communities in this region created by lack of water and pastureland. The programme strengthens capacities to manage under the land use of pastoralism and wildlife conservation, diversifies livelihoods by creating new enterprises, establishes lasting peace and security among Northern Kenya communities and contributes to the long-neglected human capacity development by investing in health, education and water infrastructure. Lastly, the programme has supported the introduction and acquisition of additional weather monitoring technologies and equipment to enhance the provision of accurate weather and climate information to various end-users, and thereby enabling knowledge based decision-making.

7.4.2.10 Assist countries with energy planning and transition to renewable energy

The Danish Energy Agency cooperates with the governments of a number of developing countries on capacity building and technology transfer related to sector energy transition to become a low-carbon economy. The cooperation is primarily focusing on policy improvements in long term energy planning and modeling, renewable energy integration and deployment, energy efficiency interventions and in climate change mitigation, and preparation of specific investments in renewable energy projects and technology transfer.

- Denmark and Ethiopia cooperates on expanding Ethiopian wind power. The Danish Energy Agency is among the Danish authorities who contribute Ethiopia’s ability to utilise its huge wind potential, providing technical assistance and experiences from Denmark as well best practice internationally.
- China and Denmark cooperates on transition to a low-carbon economy that proved it possible to reduce emissions and maintaining economic growth.
- Support is provided to Mexico for implementing its climate change strategy and action plans, helping to improve Mexico's frameworks for introducing renewable energy and energy efficiency interventions.
- Assistance is provided to South Africa for transforming its energy sector away from coal. The focus is on mitigating carbon emissions, increasing energy efficiency and improving conditions for renewable energy into the country’s energy mix.
- Denmark is supporting Vietnam in order to improve the Vietnamese energy efficiency and increase use of renewable energy, and investing in low emission technologies in SMEs.
- In 2015 the Ukrainian-Danish Energy Centre opened in Kiev. Here Denmark supports the Ukrainian authorities in building capacity for the implementation of Ukraine’s long term energy strategy and planning.

- The Danish Energy Agency is supporting Turkey in meeting its long-term objectives for renewable energy, energy efficiency and district heating. It is also assisting with the research and innovation agendas related to these sectors.
- Indonesia with a programme focusing on energy planning, integrating renewable energy into the energy mix and increasing energy efficiency.

In the period 2012-2016 the cooperation was carried out through the Low Carbon Transition Unit (LCTU) based at the Danish Energy Agency under the Ministry of Climate, Energy and Building. In 2017, the LCTU was replaced by the Danish Energy Agency's Energy Partnership Programme (DEPP).

The DEPP consists of experts within the fields of energy efficiency, renewable energy, mitigation analysis as well as international greenhouse gas emission baselines. The DEPP gives high quality technical government-to-government guidance to help developing countries and emerging economies with greenhouse gas emission reductions and low carbon transition in the energy sector. The DEPP works both with countries regarding general and methodological issues relevant to greenhouse gas emission reductions as well as with specific energy-related capacity building and technology transfer in selected emerging economies as described above.

Annex D3 contains further information about the DEPP.

7.4.2.11 Supporting the Indonesian Energy Transition

The Danish Energy Agency assists Indonesia reducing emission through a three-year strategic partnership programme focusing on energy planning, integrating renewable energy into the energy mix and increasing energy efficiency. This is part of a Danish supported Strategic Sector Cooperation programme, which facilitates government-to-government collaboration in areas where Denmark has decades of experience, which is valuable to rapidly emerging economies.

The cooperation operates on both technical and institutional level, and the main outcome of the SSC-programme is the support to improved modeling and energy planning, extended integration of renewable energy in the energy system and the reduction of the energy demand through energy efficiency measures. That includes the development of the Indonesian National Master Plan on Energy Efficiency and transferring Danish experiences and technology with energy efficiency to the industrial sector. It also includes capacity building within integration of fluctuating renewable energy into the energy mix and to prepare a set of guidelines on the assessment of wind power projects.

7.4.2.12 Support to sustainable energy systems

Denmark is a long-time supporter of the Energy Sector Management Assistance Programme (ESMAP), an assistance programme administered by the World Bank (WB). ESMAP provides analytical advisory services to low- and middle-income countries to reduce poverty and boost growth, through environmentally sustainable energy solutions. ESMAP builds capacity in client countries through targeted technical assistance, knowledge generation and dissemination, pre-investment project preparation, and implementation support. ESMAP tackles questions related to energy in all its forms in both rural and urban settings. It influences billions in loans for development projects, leverages public and private financing, working with global agendas on energy and climate in country partnership programs and beyond. Practically, ESMAP works in every WB client country supporting improved energy sector performance and governance, enhancing access to modern energy services and technology, increasing the efficiency of energy use, and/or promoting renewable energy.

7.5 Mobilised private sector climate investments through IFU

Denmark has made significant efforts to establish new and innovative instruments to mobilise private finance for climate relevant investments in developing countries. The main bilateral vehicle for these efforts has been the Danish development financing institution IFU (Investeringsfonden for Udviklingslande or Danish Investment Fund for Developing Countries).

Table 7.4 below shows the amount of private sector investments mobilised through projects that are co-financed by public resources from IFU and the Danish MFA:

In 2016: DKK 1,487,055 private investments mobilised.

In 2015: DKK 1,297,214 private investments mobilised.

The Danish Climate Investment Fund (DCIF) is involved in 11 of 16 investment projects in 2015-2016 listed in Table 7.4.

Table 7.4: An overview of spending as reported by IFU to Danish MFA*.

Approved projects in 2016 Danish Investment Fund (IFU)					
Exten-ding agency	Beneficiary country	Public financed commitment 1.000 DKK	Amount mobilised from the private sector	Mitiga-tion Rio marker	Adapta-tion: Rio marker
DCIF	India	15.800	66.841	2	0
IFU	Guatemala	3.000	5.021	2	0
DCIF	China	66.800	774.900	2	0
DCIF	Ukraine	78.100	20.293	2	0
IFU	Turkey	111.600	148.400	2	0
IFU	China	9.900	400.200	2	0
DCIF	DAC	13.700	33.300	2	0
DCIF	Brazil	5.400	38.100	2	0
DCIF	Brazil	7.000	-	2	0
		311.300	1.487.055		

Approved projects in 2015 Danish Investment Fund (IFU)					
Extending agency	Beneficiary country	Public financed commitment 1.000 DKK	Amount mobilised from the private sector	Mitiga-tion Rio marker	Adapta-tion: Rio marker
IFU	China	2.600	5.322	1	0
IFU	China	5.300	2.588	1	0
DCIF	India	52.200	127.000	1	0
DCIF	Malaysia	-	11.904	1	0
DCIF	Chile	-	51.800	1	0
DCIF	Chile	-	126.500	1	0
DCIF	Chile	-	972.100	1	0
					0
		60.100	1.297.214		

* When zero self-financing has been reported for the four investments channeled through DCIF in 2015, this is because the capital, including the private capital, from the fund itself was invested in 2014, and has hence not been included again in 2015 (to avoid double counting).

This fund is a public-private partnership managed by IFU. DCIF has raised EUR 174 million of public and private funds (until 2016) to the fund itself that is mobilising further private investments at the project level. The public funds have been provided by the Danish government and the IFU, while Danish pension funds have contributed the major part (EUR 104 million). The fund mobilises further project finance by partnering up with private co-investors, who must contribute the bulk of funds. It is estimated that the fund will generate total investments of EUR 1-1.2 billion. The fund has the opportunity to invest in all developing countries by offering venture capital and advice to climate investors.

The amounts of private finance mobilised have been calculated on the time of IFU/DCIF declaring their commitments and is expressing the level expected after the investments have been carried out.

7.6 INFORMATION UNDER ARTICLES 10 AND 11 OF THE KYOTO PROTOCOL

The steps taken by Denmark to promote, facilitate and finance the transfer of technology to developing countries and to build their capacity described in sections 7.1-7.5 above concern both the UNFCCC and the Kyoto Protocol.

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[1] Converged Statistical Reporting Directives for the Creditor Reporting System (CRS) and the Annual DAC Questionnaire, OECD DAC, DCD/DAC(2016)3/ FINAL (https://www.oecd.org/dac/stats/documentupload/DCDDAC(2016)3FINAL.pdf , https://www.oecd.org/dac/stats/DCD-DAC(2016)3-ADD1-FINAL-ENG.pdf and https://www.oecd.org/dac/stats/DCD-DAC(2016)3-ADD2-FINAL%20-ENG.pdf).

[2] Cross-cutting has been divided evenly between mitigation and adaptation. This has been done based on all projects included in the category having the same Rio marker in mitigation and adaptation (either Significant in both or Principal in both objectives).

[3] It is noted that to simplify the calculation of imputed multilateral contributions, one standard rate of climate share for each institution has been used (2014-2015 average, available from OECD *http://www.oecd.org/dac/stats/climate-change.htm*).

8 RESEARCH AND SYSTEMATIC OBSERVATION

8 Research and systematic observation

8.1 CLIMATE RESEARCH AND OBSERVATIONS IN GENERAL

Research and observations within climate in the broad sense of the word are going on at a number of institutes and organisations and cover a wide range of disciplines, from natural science to evaluation of policies and measures and societal aspects.

The Danish Meteorological Institute (DMI) carries out observations of climate parameters (atmosphere and ocean) under the World Meteorological Organisation's (WMO) programmes and sub-programmes: the World Weather Watch Programme (WWW), Global Atmosphere Watch (GAW), the Global Observing System (GOS), the Global Climate Observing System (GCOS) and the Global Ocean Observing System (GOOS). DMI also participates in the Network for the Detection of Atmospheric Composition Change (NDACC).

The Technical University of Denmark (DTU) is a founding member and national contact point of the European Climate Research Alliance (ECRA). Denmark is currently active in ECRA's collaborative programmes via DMI (polar research) and DTU (programmes on sea level, hydrology and high impact events, where DTU coordinates the latter). DTU (Space) monitors a significant number of essential climate variables with respect to, in particular, sea ice, sea level, ice sheets, the state of the ocean and large-scale hydrological systems using remote sensing and participates in a large number of international initiatives in this regard.

Climate monitoring and research has been a key task for DMI for about 145 years. DCE – the National Centre for Environment and Energy, Aarhus University (AU) is in charge of monitoring the effects of climate change on nature and the environment.

Danish research competence concerning the physical expressions of past climate change is particularly at the Geological Survey of Denmark and Greenland (GEUS), the University of Copenhagen (KU) and Aarhus University (AU). GEUS also has competencies in glaciological studies of the Greenland ice sheet and the ice sheet's interaction with climate change, and in the effect of climate change on the water cycle in nature. The Geophysical Department and the Geological Institute at KU and the Department of Geoscience at AU have very great expertise in palaeoclimate data, and the climate group at KU is known worldwide for its ice core drilling and analyses. The departments of Bioscience and Environmental Science at AU and Department of Biology at KU contribute important research competence in relation to the effect of climate change on ecosystems.

DMI has an extensive international scientific record within regional climate modelling and is the leading national authority on regional climate change projections. DMI also operates global climate models in order to investigate interactions and feedback mechanisms between atmosphere, ocean, land surface and ice on a larger scale.. Several other Danish institutions, notably KU, AU, GEUS and the Technical University of Denmark (DTU) also work in this field or with different aspects of climate research. The Ministry of Science, Technology and Innovation, the Coordination Unit for Research in Climate Change Adaptation and the Ministry of Climate and Energy, published in 2009 a Mapping of Climate Research in Denmark[1].

It is partly on the basis of research competencies in the above areas that Denmark also participates actively in the work of the Intergovernmental Panel on Climate Change (IPCC). Denmark has contributed to IPCC work, for example through contributions to all five Assessment Reports, and continue to do so in the IPCC 6th Assessment Cycle. DTU has participated extensively in the work of the IPCC, as CLA and LA for more than 20 years. DTU contributed to the AR5 working group 3 and is further engaged in scoping and review activities for the IPCC special reports, and has been part of the scoping process for the upcoming AR6. It is expected that DTU experts will be involved in the AR6 starting in 2018.

Danish research contributes to the four core projects under the World Climate Research Programme: the Climate and Cryosphere (CliC), Climate Variability and Predictability (CLIVAR), the Global Energy and Water Cycle Experiment (GEWEX) and Stratospheric Processes and their Role in Climate (SPARC).

The Danish Centre for Energy and Environment (DCE), the Greenland Institute of Natural Resources (GINR) and Asiaq, Greenland Survey are in charge of monitoring the effect of climate change on nature and the environment in Greenland. Greenland Ecosystem Monitoring (GEM) constitutes the main monitoring programme on ecosystems and climate change in Greenland. GEM covers marine, terrestrial, limnic, atmospheric and glacial components of different monitoring sites in Greenland, which also operate as key sites for climate research. The GINR conducts research into Arctic ecosystems and how they are affected by climatic and human impacts. The GINR also monitors the living resources and the environment in Greenland and advises the Government of Greenland and other authorities on sustainable exploitation of living resources and safeguarding the environment and biodiversity.

A webportal, Isaaffik Arctic Gateway (isaaffik.org), was established in 2015 in order to facilitate arctic scientific collaboration. It presents an overview of current and future expeditions, research projects and courses. Among other, it enables researchers and institutions to coordinate logistics, which are often costly parts of projects in the Arctic.

In the Faroe Islands, research related to climate and climate changes is primarily conducted on the Faroe Marine Research Institute but also on the Natural History Museum and the University of the Faroe Islands. The Faroese Marine Research Institute is also responsible for a series of systematic ocean climate observing systems. Other institutions, The Road Authority and the Fisheries Inspection are as well responsible for some systematic climate observations.

8.2 Research

8.2.1 Research policy and funding

Climate-related research in Denmark has grown within an already existing framework of institutional activities. Danish climate research was mapped in 2009. The mapping showed the picture of a relatively small research field with a strong international position. In an international perspective, Danish climate research has extensive publication activity compared with the rest of the world, and in addition it has significant impact in terms of the number of citations received. The mapping showed that Danish ice core research and palaeoclimatology research are particularly visible in the international context.

In June 2017, the Danish Agency for Science and Higher Education published the research catalogue RESEARCH2025[2]. The objective of the RESEARCH2025-catalogue is to provide a consolidated overview showing the most important research areas of the future as seen from the perspectives of businesses, organisations, ministries, Danish knowledge institutions as well as a wide variety of other stakeholders.

The RESEARCH2025-catalogue will function as a source of inspiration and knowledge and as a basis for prioritizing research investments in various contexts such as political negotiations of the distribution of the research reserve, strategic considerations at Danish knowledge institutions and in relation to Danish participation in international research cooperation.

The catalogue is the result of an extensive mapping and dialogue process and focuses on the research needs within four main areas (1. New technological opportunities, 2. Green growth, 3. Better health and 4. People and society) and 19 different subthemes. The objectives and perspectives for the theme on 'Climate change and adaptation' is the need for research that can strengthen the knowledge base to make decisions in a number of areas of society. The research must create more solid and detailed knowledge about climate processes and changes as well as the effects of climate change. Together with new forms of organization, management tools and financing models this could support climate mitigation and adaptation efforts. The effort could also support Denmark's participation in international cooperation activities on climate change, including in connection with knowledge-based international regulation and its implementation. The research should contribute to the development of new, innovative technologies and products in business and robust solutions for the society that addresses the challenges created by a changing climate. The research could address development of new technologies, efficient planning and adaptation within areas such as new crops, water systems, coastal protection, sewerage, construction and construction, fishing, aquaculture, energy, etc. in relation to Denmark's adaptation to climate change. For the arctic parts of the realm, also shipping, tourism and mineral extraction can be added. New innovative solutions and services in the field of climate adaptation are globally sought after and could contribute to Danish exports.

The Innovation Fund Denmark participates (from 2016 as observer) in the European Joint Programming Initiative 'JPI Climate – Connecting Climate Knowledge in Europe'[3]; an initiative to coordinate and align European research programmes within the area. Denmark is also participating in the extensive 18M ERA4CS Co-Fund action on climate services[4], which was recently initiated, with 5 projects (DTU participates in 2, GEUS, DMI, KU, AU each in one).

In the Faroe Islands, a number of institutions participate in research related to climate and climate changes.

Climate-related research in Denmark, Greenland and the Faroe Islands is described in detail in the following sections.

8.2.2 Climate processes and studies including palaeoclimatic studies

8.2.2.1 DMI

DMI carries out research on atmospheric , oceanic and cryospheric processes and their interactions, all of which are important in connection with global climate change. These process studies include natural atmospheric-oceanic-cryospheric interplay on time scales from years to decades, including main processes of importance for deep water formation in the North Atlantic. Also, DMI has developed a fully interactive ice sheet model that responds to climate variations and feeds information about the runoff from the melting processes into an Earth System Model and an ocean model to close the water budget. DMI further uses high-resolution regional modeling to study the snow and firn processes governing the surface mass balance of the Greenland Ice Sheet.

Studies are performed on the downward propagation of the influence from the stratosphere on tropospheric climate. Studies have also been conducted of the processes in the tropical tropopause that control water vapour entering the stratosphere, and on models for air traffic impact on the climate.

DMI works on improving statistical methods for reconstructing past climate from proxy data from e.g. tree rings and pollen.

8.2.2.2 University of Copenhagen

The Climate and Geophysical Department at the Niels Bohr Institute at the University of Copenhagen is strongly involved in studies of climate processes in the research fields of climate, meteorology, oceanography and glaciology. The research includes development of atmosphere and earth-system models to understand the large-scale dynamics of the atmosphere, mapping the natural and anthropogenic climate change and variability, studies of how ocean processes contribute to the large climate fluctuations and evolution of the ice sheets and sea level rise. Through drilling deep ice cores through the Greenland ice sheet, palaeo-records of past temperatures, precipitation, greenhouse gas concentrations, solar irradiance, impurities and volcanic eruptions are measured and models are applied to the research subjects listed above with the objective of understanding the governing processes of past and future climate.

8.2.2.3 Technical University of Denmark (DTU)

Research teams at the Technical University of Denmark works primarily on climate processes related to wind, precipitation and the marine environment, ice sheet and sea ice dynamics as well as on land surface and hydrological systems together with international research partners and/or partners from University of Copenhagen and DMI.

8.2.2.4 University of Southern Denmark

At the University of Southern Denmark, research is going on within the areas of the stability of the climate system, the role of the ocean in the climate system, as well as the chemical and biological development of the atmosphere and the ocean.

8.2.2.5 GEUS

GEUS studies the effects of past climate change in the hydrological cycle, especially in relation to groundwater conditions and the interaction with surface water. The effects of heavy rain and higher temperature on groundwater formation and the quality of the water are addressed in relation to the environment and the drinking water supply. Also the occurrence of flooding and salt water intrusion is studied.

A key research topic at GEUS is the study of mass balance and dynamics of the Greenland ice sheet, including its interaction with climate change and effect on changes in water level and interaction with ocean circulation variability. This includes the effects of surface albedo variability and refreezing of melted ice on freshwater run-off and the freshwater flux to the fjords and oceans from the ice sheet are measured and evaluated.

GEUS works with reconstructing longer term records of climate and environmental change based on sediment cores in order to assess the magnitude of current changes in the Arctic. Furthermore, the aim is to better understand the complex interactions between the climate, oceans, sea-ice, and the Greenland Ice Sheet. Specifically, GEUS researchers analyse sediment archives from marine and lake environments using sedimentological, biogeochemical, and microfossil proxies to reconstruct past changes in temperature, salinity, ocean current strength, glacier activity, meltwater and freshwater dynamics, sea-ice variability, nutrient status, and primary productivity.

GEUS works with long-term surveillance of Danish natural woodlands (non-intervention forest reserves), including trees, regeneration, pollen deposition, flora and soil conditions. The studies were initiated in 1948.

GEUS further studies the development of the coastal regions and their responses to the rapid Holocene sea level rise. These studies provide input to assessments and modelling of the coastal responses to coming sea level changes thus forming part of the science fundament for mitigation of climate changes.

Further, GEUS has mapped and estimated the geothermal energy resources in the Danish subsurface in order to facilitate the utilisation of this renewable energy source. GEUS provides data and advices for the relevant authorities at municipal and national level, as well as consultancy advices to the exploration and exploitation industry.

8.2.2.6 Aarhus University

AU is carrying out research in how, since the last Ice Age, climate change has affected the biological structure of North Atlantic lakes in Greenland, Iceland and the Faroe Islands. Paleolimnological methods are being used to develop projection models.

8.2.2.7 Greenland Institute of Natural Resources (GINR)

GINR houses the Greenland Climate Research Centre, through which most of the monitoring and research on effects of climate changes on the marine habitat is carried out.

GINR investigates climatic changes and the effects of temperature variability through the past 10.000 years by analysing phytoplankton in sea bottom substrates around West and East Greenland.

GINR is co-leading an interdisciplinary research project using both natural and social sciences to analyse and improve our understanding of long-term climate variability in Greenland. The project is exploring the links between variations in past sea ice, climate conditions, changing environments and Arctic human societies. The links between humans, changing environments and sea ice are used to describe settlement patterns in the Godthåbsfjord. Additionally, through human responses to environmental change, socio-economic patterns may reciprocally be used, supplemented and discussed by using the perspectives of the natural sciences, e.g. by understanding sea-ice conditions and changing fjord environments. Here, emphasizing that increasingly, understanding climate change requires an interdisciplinary perspective. The project provides a detailed reconstruction of changes in climate, environment and sea-ice cover in the inner part of the Godthåbsfjord.

Climatic records covering the last 5000 years will be constructed with special focus on the past 1000 years. Investigations are based on marine geological surveys, oceanography studies, including studies of the rapid changes in relative sea level, variations in the distribution and thickness of fjord sea ice, dynamics of the tidewater glacier, KNS and the general impact of changes in ocean circulation. This will be supplemented by analysis of the cultural landscape, summarizing the changes of these parameters, to show how environmental and climate changes over time have affected the living conditions of the cultures.

8.2.3 Climate modelling and the climate of the future

8.2.3.1 DMI

With substantial support from the European Commission, DMI is working closely together with research institutions in Europe on analyses of the climatic consequences of increased greenhouse effect. The main emphasis is on Denmark and the European region, as well as the Arctic, but global research is also being carried out.

The work includes both development and employment of models for scenario calculations of the climate of the future. The models include:

- Regional dynamic ocean models for calculating changes in ocean and sea ice. The focus areas are the North Sea, the Baltic Sea and Greenland waters.
- A regional dynamic atmosphere-climate model for calculating regional/local climate change and variations. The main focus has been on Denmark, Europe, and Greenland, with applications also in Arctic regions, West Africa and India.
- Global Earth System modelling: dynamic coupled atmosphere-ocean-sea-ice models, which are used to study climate change (primarily as a consequence of increased greenhouse effect) and internal variability in the climate on decadal to centennial time scale.
- State-of-the-art ice-sheet models coupled to regional climate models for studies of the changes of the Greenland ice sheet in the past, present and future.

DMI has contributed to the CMIP5 (Coupled Model Intercomparison Project, Phase 5) under the WMO's World Climate Research Programme, and the results of the simulations using the RCP (Representative Concentration Pathway) scenarios fed into the IPCC's Fifth Assessment Report. This work continues and DMI will contribute to the ongoing CMIP6 which will feed into the coming IPCC reports.

Regional climate simulations on down to 5 km grids are carried out in connection with national, European and international projects, covering Europe in particular, but also Greenland and the Arctic.

With regard to regional simulations, the most important focus areas for Denmark are changes in (extreme) precipitation, soil moisture and storm activity. For Greenland, of special interest are changes in simulated snow accumulation, melting and refreezing on the ice sheet and changes in permafrost conditions.

Output from the simulations from the EU projects ENSEMBLES (2004-2009) and PRUDENCE (2002-2004) are made available to all groups of researchers who are studying the effects of climate change, and to decision makers taking part in planning and implementation of adaptation to climate change on a server at the DMI. These data have been used extensively by researchers from cross-cutting disciplines in Denmark and in Europe for assessments of climate-change impacts and risks. The hosting of data archives from regional climate models initiated in the EU

PRUDENCE and ENSEMBLES projects continues with the WCRP CORDEX projects, where DMI hosts data in the so-called ESGF nework. These data are accessible to the general public.

8.2.3.2 University of Copenhagen

Research at the Department of Geoscience and Natural Resource Management and the Department of Biology at the University of Copenhagen includes experimental/field-related, theoretical, and modelling aspects of vegetation and greenhouse gas emissions and helps to indicate methods that can be used for evaluating the climate of the future.

At the Niels Bohr Institute, the Climate and Geophysics researchers develop atmosphere circulation models, Earth system models and state-of-the-art ice-sheet models to predict the changes in the Arctic regions and how they will influence global and regional sea level rise. The research is done in collaboration with GEUS and DMI and is partly funded by EU framework programmes.

8.2.3.3 Technical University of Denmark (DTU)

Research at the Technical University of Denmark focuses on current and future damages of climate change events based on integrated modelling of coastal, pluvial and fluvial flooding events, and damages on a wide range of economic, human and ecosystem assets. The methods employed encompass dynamic and statistical downscaling techniques, hydrological modelling, cost benefits analysis, and decision making in the context of complex uncertainties. Other research areas covered by the Technical University of Denmark include wind, other kinds of hydro-meteorological extremes (e.g. droughts) and interactions between climate and hydrological systems. Limited activities are ongoing within the areas of (regional and global) climate modelling and on the application of statistical methods in climate science. The research is done in collaboration with Danish and international partners, primarily funded by Danish and EU research and innovation programmes.

8.2.4 Effects of climate change

The effects of climate change on nature and ecosystems are covered by research at DMI, GEUS, the University of Copenhagen, Aarhus University, the Technical University of Denmark, Greenland Institute of Natural Resources and the Danish Coastal Authority.

8.2.4.1 Aarhus University (AU)

AU is working on the effects of climate change, especially in Greenland, and it is carrying out a standardised biological/ecological monitoring programme covering a broad spectrum of processes, fauna, and flora. In connection with this project, the institute is carrying out research projects aimed at increasing knowledge of basic Arctic ecosystems. These include a strong focus also on physical drivers and feed-back mechanisms like snow modelling and research in the energy- and carbon balance of Arctic ecosystems.

AU is running the High Arctic Zackenberg Research Station, an ecosystem research and monitoring facility in Northeast Greenland (74º28' N). Zackenberg is owned by the Government of Greenland and is operated by the Department of Bioscience, Aarhus University. The work at Zackenberg is coordinated through the Zackenberg Ecological Research Operations programme with the following institutions as partners: the Department of Bioscience at Aarhus University, Greenland Institute of Natural

Resources, the University of Copenhagen, Asiaq - Greenland Survey and the Geological Survey of Denmark and Greenland. The station enables increased research in high-Arctic ice and permafrost as well as the effect of climate change on the high-Arctic sea, air, geology, animals and plants.

AU has since 2014 been running the Villum Research Station at the military outpost Station Nord in high arctic North Greenland (81°36' N, 16°40' W). Villum Research Station is owned by the Greenland Government and is being operated by AU in cooperation with the Danish Defense (the Arctic Command). The station hosts individual scientific projects focusing on atmospheric, marine and terrestrial research. In addition to this, the station is also used as a permanent base for an extensive long-term monitoring programme with main focus on atmospheric pollution, but also including effects of Climate Change on arctic marine and terrestrial ecosystems.

The station is open for access throughout the year, and it can host up to 14 scientists at a time.

AU is carrying out research in the effect of climate change on biodiversity and function of the soil environment, in laboratory as well as field conditions. Work includes genetic variations in soil-living fauna, and the fauna's physiological adaptation to extreme climate conditions. AU has research competences concerning tolerance limits for air pollution for particularly sensitive terrestrial ecosystems. In particular, the interaction between climate change, chemical substances and other factors are investigated.

AU has built up competence focused on the function and dynamics of the Arctic marine ecosystem and it is investigating an Arctic fjord system and, within this, relationships between production and nutrient conversion.

Within freshwater, AU has research competence concerning the effect of climate change on nutrient degradation and biological interaction in watercourses and lakes. Studies are being carried out for instance in Arctic, temperate and subtropical lakes, where biological interaction is being studied along climate gradients. Experimental studies are carried out at an advanced test plant at Silkeborg. Models are developed as tools of projection of nutrient transport as well as effects on freshwater ecosystems.

AU is working with climate-change effects across climatic gradients, analyzing, modelling and comparing climate effects at different spatial and temporal levels using an interdisciplinary approach.

AU is doing research in the effects of climate change on air pollution, including the importance for transport of pollutants such as POP and mercury to the Arctic.

AU is carrying out research on the effects of climate change on marine ecosystems, studying how marine Arctic as well as European ecosystems respond to climate change, in terms of both biodiversity changes and ecosystem structure and function.

AU works with the interaction of climate and agriculture, including effects of climate and atmospheric CO_2 on processes in the soil-plant system. This includes research on how climate change and CO2 affects photosynthesis and crop yields. The research includes both experimental and model based studies. The experimental studies are mostly conducted in controlled environments. A range of crop models are used for studying effects of climate changes on crops and livestock systems. Also, monitoring and experimental data are used in statistical analyses to explore crop-climate interactions. This research is mostly conducted in an international collaboration as part of the European MACSUR knowledge hub and the global AgMIP project. In addition

AU has ongoing research collaborations with research institutes in China, Iran, Ghana and Tanzania involving assessments of climate change impacts on agriculture.

8.2.4.2 GEUS

GEUS has competence concerning long-term variations and effects in ecosystems in Denmark and Greenland and on the Faroe Islands caused by the climate. The institute is investigating how the ecosystems react to climate change in vegetation, lakes and marine environments in Denmark and Greenland and in forests in Scandinavia. It also registers changes in sea level and their effect on the water cycle, and conduct research regarding coastal responses to sea level changes.

The formation of groundwater and the effects of climate change on this important resource is being covered by GEUS in several studies. The studies of the hydrological cycle include expected changes in groundwater levels and saline intrusion in the groundwater as well as changes in river discharges and water levels.

Studies have been carried out on the effects of climate change on flooding of urban areas from rivers in Denmark as well as studies of the effects of climate change on pesticide leaching and transport in groundwater and surface water.

Studies of the permafrost in Greenland focus on the consequences of the thawing on the Arctic ecosystems and the mobilization of potentially huge amounts of carbon and nitrogen and release of greenhouse gases (CENPERM CENTRE).

8.2.4.3 Technical University of Denmark (DTU)

The Technical University of Denmark carries out research, methodology development, capacity building and implementation of actions and strategies to reduce the vulnerability and enhance the climate resilience of developed and developing countries. With respect to developing countries the work is carried out in close collaboration with UN Environment (UNEP), through the UNEP DTU Partnership (UDP), with core funding from the Danish Ministry of Foreign Affairs (Danida). Work on developed countries focuses on Europe and is mainly funded by research grants, innovation activities, and government-funded programmes in Denmark and Europe.

Within a Danish and European context, the main focus for DTU has been on urban landscapes and anticipated changes in pluvial and coastal flooding due to increasing precipitation extremes and rising sea levels. A framework has been developed that is being implemented as a standard tool for insurance companies, the private sector, the emergency management units, municipalities and utilities in their strategic decision making on climate change adaptation.

DTU also carries out research and modelling on the effect of climate change and future climate policies on energy and water systems and related environmental and socio-economic impacts at a variety of different scales. The main emphasis is on windpower, hydropower and other renewables, including the risks, impacts and adaptation of related sectors.

To strengthen the capacity for climate risk management, DTU works with academic and public and private partners on development and application of analytical frameworks for assessing climate change impacts and vulnerability, and to identify and evaluate response options. By developing and testing new analytical approaches, DTU facilitates enhanced integration of information about climate change, climate variability and related costs into projects and policies. Likewise, DTU actively supports the development of actionable climate services as endorsed by World Meteorological

Organization and other international bodies. In this context, DTU currently participates in several major climate service projects funded under EU Horizon 2020 and the ERA-NET Consortium "European Research Area for Climate Services" (ERA4CS).

UNEP DTU Partnership is engaged in both analytical tool development and country capacity building in the new area of Transparency under the Paris Agreement. Engagement covers both mitigation and adaptation. Particularly for adaptation, there is a significant need for new research and methodology development to support transparent monitoring, reporting and evaluation of adaptation action and support at national and global level.

8.2.4.4 DMI

DMI is lead partner in a project on climate change adaptation strategy in the North and Baltic Sea region, carrying out research on the effects of climate change, including analyses of precipitation, sea level change, biodiversity and surface waves/erosion.

DMI is modelling regional and global changes of permafrost, both on land and at the bottom of shallow shelf seas in the Arctic. DMI is involved in modelling and field studies to quantify the long-term fluxes of greenhouse gases from the Northern Russian land mass due to permafrost thawing.

DMI is an active partner in several projects under the COPERNICUS initiative, where one goal is to construct a publicly accessible "Climate Data Store" with both direct data access, numerical tools, and guidance for impacts modellers. DMI participates in production of regional simulation, development of climate indices and data for storm surge and waves, and in the construction of guidance for users wrt. sub-ensemble construction and validation.

8.2.4.5 University of Copenhagen (KU)

The effects of climate change on natural and managed ecosystems have strong focus at KU. The research is partly based on numerous large-scale in-situ infrastructures including long-term experiments, particularly in forests, an EU-funded infrastructure of climate change manipulation experiments and climate gradients INCREASE and the Centre for Permafrost CENPERM funded by the Danish National Research Foundation. Furthermore, the Department of Biology (BIO) and the Department of Geosciences and Natural Resource Management (IGN) have a number of Arctic climate manipulation experiments in Abisko, Disko and Zackenberg. The research comprises biological processes, ecosystem functioning, biodiversity, carbon and nutrient cycling and adaptation of processes and ecosystems to extreme climate conditions and moderate changes. KU has competences from both managed and natural terrestrial and aquatic ecosystems, working at scales from molecules to landscape and at different temporal scales.

BIO performs extensive work in climate change effects on plant-atmosphere and plant-soil-microbe interactions, making use of long-term ecosystem manipulation infrastructure as warming, CO_2 enrichment and altered nutrient input and precipitation patterns, mainly in the Arctic but also in temperate ecosystems. The experimental work spans from physiological processes at fine root and leaf level to plot and ecosystem scale, and includes work on greenhouse gas emission, volatile organic compound emissions, nutrient cycling and vegetation responses. The work is integrated in CENPERM and also includes upscaling and modelling.

IGN at the University of Copenhagen is doing research on soil-forming processes in relation to climate and vegetation that are of significance for, amongst other things, the exchange of greenhouse gases between soil and the atmosphere. This is performed on the basis of a wide range of ecological and climatic regions from processes in the Arctic areas (e.g. CENPERM), Danish sites and tropical sites e.g. in Africa. In the CENPERM different scientific disciplines meet to investigate the biological, geographical and physical effects of permafrost thawing. CENPERM combines field experiments in Greenland, Svalbard, northern Sweden and Russia under extreme conditions with experiments under controlled conditions in our laboratories at University of Copenhagen.

Both IGN and BIO also carry out research on the impact on ecosystem function and structure of changed climate and potential for adaptation and mitigation based on management of forests, heathlands and nature areas, changes in plant diseases and invasive species. This includes research in genetic aspects of adaptation and development. This is further supported by the cooperation, including forest monitoring performed for the Ministry of the Environment.

IGN carries out studies of the impact of recent climate change on vegetation productivity at global scale, making extensive use of Earth Observation satellite data.

The University of Copenhagen, Department of Plant and Environmental Sciences (PLEN), has significant research on the effects of climate change on the production levels of future agricultural biomass (food, feed, fibre, fuels) and the related impacts on soil quality and fertility, as well as feedback mechanisms on environmental emissions e.g. effects on soil carbon sequestration and greenhouse gas emissions. The cross-disciplinary Centre for Sustainable Agriculture and Forestry Systems (http://safor.ku.dk), hosted by PLEN, forms an umbrella organisation for many of these activities. An example of such collaborative work is the I-REDD+ EU-project on ‘Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks’ (http://www.i-redd.eu/) coordinated by IGN.

Mitigation research of climate changes on wetland and dryland crops is also hosted by BIO in collaboration with leading universities in Japan and Australia. Emphasis is on traits in root and shoot tissues that confer flood tolerance of rice and wheat and is supported by a grant from the VILLUM Foundation as well as numerous international grants.

8.2.4.6 Danish Coastal Authority

The Danish Coastal Authority (DCA) is working with projects focusing on the effect of climate change on coastal erosion and flooding and how to adapt the coastal protection in the most sustainable way. DCA is advising the planning authorities in Denmark on how to plan for climate change and has published a report “Guidelines for climate adaptation”. DCA is responsible for implementing the EU’s flooding directive in Denmark.

In different research projects DCA focus on subsidence of coastal areas based on satellite data. The focus is also flood protection assets and the optimum management plan in the light of climate change (Interreg project FAIR). There is a focus optimizing coastal protection measures in todays and futures climate (Interreg project BWN). The Interreg project FRAMES focus on dynamic planning in the future and the society’s recovery phase after a flood event.

8.2.4.7 Roskilde University

Environmental biologists at the Department of Science and Environment, (INM) are doing research in climate effects on the invasion of marine species.

8.2.4.8 Aalborg University

At the Aalborg University, research is being carried out on the impact of climate change on society, including regional perspectives on climate change, the impact of climate change on industrial and financial structures as well as human, political and rhetorical implications from the climate change discourse.

Furthermore, studies are being carried out on the effects of climate change on energy consumption in housing, the impact on architecture, building components and technologies as well as studies on the impact on everyday life and the indoor climate.

8.2.4.9 Greenland Institute of Natural Resources (GINR)

As part of the GEM (Greenland Ecosystem Monitoring) GINR is monitoring the effect of climate change on nature and the environment in Greenland. Since 1995 Zackenberg Research Station in Northeast Greenland (ZERO) has facilitated research and monitoring in the high Arctic (NE Greenland). In 2007 a low Arctic counterpart (Kobbefjord, SW Greenland) (NERO) was established. These two stations, which are funded by the Danish Ministry of Climate and Energy through the DANCEA programme, form the basis of the Greenland Ecosystem Monitoring (GEM). The GEM collects long-term data series in order to quantify variations in biological as well as geophysical parameters in the terrestrial, aquatic and marine environments on a seasonal as well as yearly basis in relation to local, regional and global climate change.

The GEM consists of several basis programmes: ClimateBasis collects data on climatological and hydrological conditions, e.g. data from automatic weather stations. GeoBasis collects data on changes in the landscape in relation to climate, hydrology and physics, e.g. data on snow and ice and on methane and CO_2 flux from the vegetation. BioBasis collects data on biological parameters in lakes as well as on land, e.g. data on arthropods, birds, vegetation phenology, NDVI, CO_2 exchange between the vegetation and the atmosphere. MarineBasis collects data on physical, chemical as well as biological oceanographic parameters.

These monitoring programmes also provide a data and knowledge foundation for on-going national and international research projects related to climate change in Greenland.

GINR conducts annual surveys on marine mammal, fish and shrimp stocks in West and East Greenland offshore areas and in the Disko Bay. The monitoring programme provides unique time-series dating back several decades, thus providing knowledge on the response to natural climate variation and ongoing anthropogenic climate change.

GINR provides scientific advice for the Greenland Self-government on sustainable harvest and conservation of marine and terrestrial mammals, birds and vegetation. In this regard, a significant amount of research is conducted on the effects of climate variation, primarily sea ice dynamics, on abundance and behaviour of marine mammals and birds. Moreover, the GINR has developed methods for obtaining oceanographic data in the vicinity of glacier fronts or areas heavily influenced by sea ice by means of tagging diving mammals. Such areas are not easily accessed in traditional oceanographic surveys, but particularly interesting in a climate change context providing invaluable data for understanding the oceanographic feedback processes.

8.2.4.10 The Faroe Marine Research Institute - (Havstovan)

The Faroe Marine Research Institute (FAMRI, www.hav.fo) conducts studies of the Faroese marine environment and its living resources, informs the Faroese authorities and public about these conditions and provides advice on sustainable exploitation.

Each year FAMRI informs the Faroese government about the state of fish stocks in Faroese waters and other waters that Faroese fishing vessels use and provides scientific advice and assessments according to the law on commercial fishing. For this purpose, FAMRI performs annual fisheries surveys with the research vessel "Magnus Heinason" and chartered vessels, in addition to analysing catches from commercial fishing vessels.

FAMRI makes regular surveys of the marine environment each year. They highlight the changes from one year to another and help understand the changes in physical conditions and the living resources.

FAMRI carries out a number of experimental fishery projects each year. The Institute also participates in Nordic and international projects in fisheries and marine science of various kinds. This includes monitoring of the oceanic heat transport towards the Arctic, most of which passes by the Faroe Islands, and one of the main overflow branches, returning to feed the AMOC, which FAMRI has monitored for more than two decades.

On-going projects include:

- Faroese Monitoring (FARMON) in 2017-2019
- Blue-Action: Arctic impact on weather and climate in 2016-2020
- Western Valley OverfloW (WOW) in 2016-2018
- Optimizing and Enhancing the Integrated Atlantic Ocean Observing System (AtlantOS) in 2015-2019

More information about on-going as well as completed projects is on FAMRIs homepage: http://www.hav.fo/index.php?option=com_content&view=article&id=7&Itemid=111 (in Faroese).

8.2.4.11 Natural History Museum (Náttúrugripasavnið)

The Faroese Museum of Natural History (www.savn.fo) is responsible for biodiversity collections from the Faroe Islands, for research in biodiversity, and for presenting the current state of knowledge on biodiversity to the public.

The Faroese Museum of Natural History is participating in projects on the effects of climate change on the vegetation and selected plant species. Since 2001 an ITEX (International Tundra experiment) site was established in alpine area, and the vegetation and phenology of selected plant species have been followed at a regularly basis.

In 2009 a GLORIA (Global Observation Research Initiative in Alpine Environments) site was established on four mountain summits in the Faroe Islands. The aim of the network is to establish and maintain vegetation and temperature data collected at the GLORIA sites for discerning trends in species diversity and temperature. Globally, most sites are investigated at 6-7 year intervals, and the site in the Faroe Islands was monitored for the second time in 2015. For inter-comparison, it is following the same cycle as at the other sites.

On-going projects include:

- Global observation research initiative in alpine environments (www.gloria.ac.at/)
- International Tundra Experiment (ibis.geog.ubc.ca/itex/)

8.2.5 Economic and other research, including evaluation of climate change and possibilities for mitigation

It is important to take account of the economic consequences of the different ways to mitigate greenhouse gas emissions.

8.2.5.1 Technical University of Denmark (DTU)

DTU is involved in various research activities, primarily relating to policies and measures for reducing greenhouse gas emissions, and relating to emission scenarios for greenhouse gases. The activities include development and implementation of international methodological standards for cost and sustainability analyses of reduction policies, discussion and testing of baseline approaches and various project and sector studies for the energy, transport, and agricultural sectors. DTU has a significant research portfolio in the areas of renewable energy, mainly energy system analysis and planning, wind and solar, energy efficiency options and policies, intelligent energy systems and integration.

The research activities include direct support for the United Nations Framework Convention on Climate Change in many areas, often combined with capacity and training programmes in developing countries.

With the Paris Agreement, the activities focus on supporting implementation of the Nationally Determined Contributions where UNEP DTU Partnership has worked with 35 countries on their submissions before Paris and is now engaged in supporting integration and implementation of the new national plans.

One specific area where research and capacity building are moving forward fast is the issue of transparency i.e. the countries' ability to assess and subsequently report on the results of their national mitigation and adaptation actions in a clear, comparable and unambiguous manner. UNEP DTU Partnership has a leading global position in this area covering both methodology and tool development, and country level support.

8.2.5.2 Aarhus University

Research at Aarhus University is concentrated on the judicial, economic and politological aspects of climate policy and legislation at UN, EU and national levels. Cooperating with researchers from the University of Southern Denmark, University of Copenhagen, and a number of partner institutions abroad, and following up cooperation established with the former Centre for Social Science Research on the Environment at Aarhus University, general competence is assured in cross-disciplinary research into law, politology and economics. Research focuses on analyses of effectiveness of specific policy instruments (solely or in interaction with other instruments), both traditional regulatory measures, information measures, economic policy instruments like taxes, quotas and subsidies, and flexible mechanisms (JI and CDM agreements). Decision-making processes and target group behavior/perceptions on climate change are also focus areas for Aarhus University. Moreover, researchers have thorough knowledge of environmental and energy policy and legislation. Such competence forms the basis for cooperation on a Masters degree in Environment and Energy Law, cf. Chapter 9.

AU's Department of Environmental Science has general competence in setting up and evaluating mechanisms for reducing emissions and special competence within the agricultural, energy and transport sectors. In addition, it possesses general knowledge of the different aspects of the Kyoto Protocol, including research competence concerning the Clean Development Mechanism and Joint Implementation. Activities include preparation of guidelines for economic assessment of adaptation to climate change.

AU carries out research on the social and economic dimensions of climate change adaptation, such as how economic analyses are used in the decision-making process, economic modelling of changes in land use. AU carries out research on synergies in green, sustainable cities and climate adaptation and sociology research on how private and public actors perceive and react to climate change, and how they participate in climate change adaptation activities.

8.2.5.3 University of Southern Denmark

The University of Southern Denmark in Odense carries out research on climatic, ecological and anthropogenic impacts on marine environments, particularly in the North Sea, in Greenland and in the Baltic Sea.

8.2.5.4 University of Copenhagen

At the University of Copenhagen, the social science aspects (economics, law, sociology, anthropology etc.) of adaptation to, and mitigation of, climate change effects is an integrated aspect or a core focus of numerous research activities as well as educational elements. It includes studies of how adaptation to climate change effects enters into decision making for e.g. policy makers, natural resource managers, industry, land owners and households, using economic optimization approaches, environmental sociology and legal regulation as well as anthropological methods. The research addresses the behaviour of decision makers in Denmark as well as in many foreign (developing country) cases, and cases that concern a wide range of topics including e.g. biodiversity conservation under change, land owners' adaptation to changing climatic conditions, rural household livelihood, transition to greener energy and coping strategies.

Mitigation measures and regulation approaches are thus topics of research, in particular for the economic and legal disciplines, but also others. Apart from focus on e.g. taxes, subsidies and other promoting measures for renewable energy technologies, the ETS and similar regulation tools, there is also emphasis on more general issues like urban industrial and households' decisions on transport, energy consumption etc., as well as global issues like a reliable design of the REDD+ mechanism and reduction of CO2 emissions.

Since 2010, research at the Faculty of Law has also focused on addressing the challenges of the regulation of greenhouse gas emissions from the energy sector and the two sectors of the economy excluded from the scope of the Kyoto Protocol, namely: international aviation and maritime transport. Also, research on the legal implications of REDD has been developed. Two PhD theses and books have been published on these aspects of mitigation, as well as a number of outputs in the shape of journal articles and paper presentations at conferences worldwide.

Furthermore, research is carried out at the Faculty of Law on the highly relevant issue of the role of industry action in the climate change conundrum. Specifically, a project on Smart Cities Accelerator on integration of more renewable sources and energy conservation in the urbanization that takes place and a project on Climate Change and International Maritime Transport: 'Legal Implications of the Maritime Industry's Voluntary Measures' is running since autumn 2016 and the end of 2015, respectively. The Centre of Public Regulation and Administration (CORA) has initiated a project on "smart" regulation that reflects developments following the Paris Agreement and has published on Global and Inclusive Governance.

The Faculty of Law is also involved in a project on 'Energy Innovation and the Law in the Age of Climate Change' (2016-2018) and has led a project in 2016 for the Nordic Council of Ministers ('Nordic Working Group for Global Climate Negotiations – NOAK') on a transformation to low-carbon shipping to inform Nordic work on the implementation of the Paris Agreement with regards to the maritime transport sector through the formulation of a set of suggestions for Nordic action. As a result, discussion papers and a final report were published and workshops have been held. Many of these works take an interdisciplinary approach.

Crucially, the Faculty of Law has established a research network with 20 foreign universities: The Academic Advisory Group under International Bar Association, Section on Energy, Environment, Natural Resources and Infrastructure Law and established in 2016 a network with New York University School of Law, 'The Transatlantic Maritime Emissions Research Network' (TRAMEREN). These associations serve as platforms for climate knowledge exchange and research dissemination. A number of activities have been organized under the network auspices, including international conferences. Additionally, the faculty takes part in the Working Group on Climate Change of the European (COST) Action 'Ocean Governance for Sustainability – Challenges, Options and the Role of Science' (OceanGov - CA15217).

With regard to extreme weather events generated by climate change, the University of Copenhagen's Center for Disaster Research (COPE) participates in a number of international projects focusing on the management of and recovery from natural disasters. ESPREssO ('Enhancing Synergies for disaster PRevention in the EurOpean Union') - a research project funded by EU under the H2020 program, specifically targets the integration between efforts to reduce disaster risk and climate change adaptation. The Nordic Centre of Excellence on Resilience and Societal Security, NORDRESS, a 5-year project under the Social Security Programme of NordForsk in which the Faculty of Law participates, focuses on developing a particular Nordic variant of resilience towards climate risks.

8.2.5.5 Roskilde University

At Roskilde University, research is going on concerning scenario building within climate-stabilising policies, together with lifecycle analyses as a tool in economic evaluation of climate-stabilization strategies.

At the university's Department of People and Technology (IMT) research includes participation in the EU project Greeco on territorial potential for a greener economy (http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/greecoTPG.html). The development of local and regional mitigation and adaptation strategies to climate change is an important research area which is conducted in cooperation with Danish municipalities. Research also addresses public lighting strategies, transitions to energy-neutral and energy-producing buildings, transitions to public transport and energy-efficient vehicles. The implications for daily life, regional infrastructure planning and transport-related taxation is evaluated.

8.2.5.6 DMI

DMI is involved in various national and international research and networking projects for assessments of climate change impacts on the economy, energy and agriculture sectors, as well as the cost of the climate changes. In these projects, DMI develops methodology for downscaling the climate-change projections to the regions of interest, and provides expert advice for other partners of cross-cutting disciplines in the projects on applications of model projections and their uncertainties to assess the climate-change impact and risk on various sectors.

8.2.5.7 Aalborg University

At Aalborg University, focus of climate mitigation research is in part on how to reduce energy consumption from the built environment, especially the transition to low energy consumption housing, and the transport sector. Economic assessment load on energy consumption in housing and building renovation is prioritized.

Moreover, research is being done on the relations between climate change, design strategies and sustainability of industrial products, e.g. sustainable architecture in a new climate and Life Cycle Assessments.

8.2.6 Research and development of technologies and approaches to reduce greenhouse gas emissions and to adapt to climate change

From 2008 to 2012 Aarhus University hosted the Coordination Unit for Research in Climate Change Adaptation (KFT) at the DCE – Danish Centre of Environment and Energy in collaboration with the Danish Ministry of Climate and Energy, the University of Copenhagen, the Technical University of Denmark, the Danish Meteorological Institute, the Geological Survey of Denmark and Greenland. KFT has supplied authoritative climate data and climate-effect data as well as specific climate research results of relevance to climate adaptation. KFT has mapped climate adaptation research in Denmark in terms of both researchers and projects. Since 2013, a new network of climate-change adaptation researchers has been formed, including the former members of KFT as well as the DHI Group (an independent consulting and research organisation in the field of water environment).

Aarhus University (AU) is heavily involved in all university activities related to the environment, energy and climate-related issues. AU has broad competences within the topics: Future energy systems, Future climate and climate adaptation, and Competitive environmental technologies.

At the Technical University of Denmark (DTU) many Departments are engaged in research and development related to wind and solar technologies, smart energy systems, systems integration and energy system modelling. DTU has also established the Copenhagen Centre on Energy Efficiency as the Hub of the global Sustainable Energy for All initiative. The Centre is engaged in research and country and city level support to implement best practice energy efficiency technologies.

DMI works with solar resource assessment and forecasting and is involved in a Solar-PV development and demonstration project.

8.2.6.1 Energy research

Denmark has a long history of supporting research and development in the field of energy. Chapter 4.3.4.1.6 contains further information on the Danish Energy Technology Development and Demonstration Programme (EUDP) and Mission Innovation.

8.2.6.2 Aarhus University

Research at Aarhus University, DCA – Danish Centre for Food and Agriculture focuses on the agricultural sector's possibilities for adapting to climate change by changing the cultivation system, including changes in fertilisation and the use of pesticides and adapting soil tillage methods. The aim is to develop adaptation options that also reduce greenhouse gas emissions from the sector. Research at AU is also conducted within European and global research projects to address more general concerns for adaptation of agricultural systems to climate change.

At AU, Department of Agroecology and Department of Animal Science conduct a range of research projects aimed at quantifying greenhouse gas emissions from agricultural activities and the effects of management and technologies to reduce these emissions. This covers emissions from soil, livestock and manure, and many different technologies and management systems are being explored. This research is often conducted in collaboration with other European research institutes or as part of the Global Alliance on Agricultural Greenhouse Gases.

At DCA, the world's largest biogas plant for research purposes was commissioned in 2007. It can be used by scientists and private companies - Danish and foreign - for projects in biogas production and slurry separation. Recently, much focus has been given to investigate and up-scale methanisation of the CO2 part of biogas in order to integrate wind and biogas production and increase storage capacity of the renewable energy system. Since 2017, an interdisciplinary AU Centre for Circular Bioeconomy (www.cbio.au.dk) will intensify the research in sustainable and low emission biological production systems on land and in the sea. The centre further investigates the conversion of the biomass into materials and energy to substitute fossil fuels.

AU, DCA has long experience in developing dedicated energy crops with a low environmental impact and high net-emission reduction. Most promising crops are perennial crops such as willow and miscanthus, the latter utilising the C4-photosynthetic pathway, which will become increasingly effective in the warming climate. However, the high content of protein in conventional cut grass and clovers has been intensively studied with the aim of producing a local protein source instead of importing large amounts of soya bean products from other continents. Side-streams from this production are expected to be used for bioenergy, and a demonstration scale plant is expected build in 2018 based on experiences on a pilot plant built in 2015.

Denmark has opted to include detailed accounting of LULUCF as part of its mitigation efforts. Therefore large efforts have been invested at AU (DCA and DCE) to monitor and model changes in soil carbon in both mineral and organic soils. AU has developed the CTOOL model for this purpose, and this model is being applied for national accounting of soil carbon changes. This model has been proved to be reliable, and is currently being considered for application in other European countries.

AU, Department of Environmental Science is working with the main drivers behind greenhouse-gas emissions from the energy sector, the agricultural sector, and the transport sector. The University of Copenhagen, Department of Geoscience and Natural Resource Management has competence in forestry, afforestation, etc. Together, these two institutions cover the aspects of land use in the open countryside for agricultural purposes, forestry and nature. Both institutions are looking at challenges related to use of biomass from agriculture and forestry as an energy source.

AU makes general inventories of atmospheric emissions from all sectors and activities, including the greenhouse gases. The institution has special research competence in inventories from the agricultural sector, the transport sector, the industrial sector, and the energy sector. The University of Copenhagen, Department of Geoscience and Natural Resource Management contributes with inventories of emissions from forestry and changes in land-use in relation to how forests affect the forest ecosystems' carbon sinks and thus the potential binding of CO2 in biomass and soil.

AU has models for projecting greenhouse-gas emissions, based, for instance, on projections of activities in relevant sectors, with the University of Copenhagen, Department of Geoscience and Natural Resource Management providing input on forests.

AU also has research competence in modelling the dispersal of greenhouse gases locally and regionally, with special focus on Denmark, Europe, and Greenland. The Department of Environmental Science has developed a CO2 model (DEHM) for dispersal, transport, and surface movements. The model can be used to determine the size of sources and drains for CO2 in Europe over specific areas and for estimating whether these areas comply with the Kyoto Protocol. AU (Department of Bioscience and Department of Environmental Science) recently joined the ICOS (Integrated Carbon Observation System) with a number of ecosystem monitoring sites and an atmospheric site in Greenland where greenhouse gas emissions and concentrations are monitored and subsequently used for research and input to climate assessments (e.g. SWIPA, IPCC etc).

AU's department of Environmental Science has a large research group working on different aspects of climate change adaptation, including eg: risk assessment, economic assessment of climate adaptation measures, user involvement, farmer perception and adaptation to climate change, climate change communication, development of climate services to the public and private sector, sustainable urbanization and nature based solutions.

AU has several research areas of relevance to local climate adaptation solutions related to excess water both in urban and open areas (fluvial, coastal and groundwater). Some of the central research areas are: Groundwater identification and modelling, development of nature based solutions for water retention and development of novel treatment technologies for urban storm waters.

Two new AU interdisciplinary research centres in Climate and in Water Technology will address some of these issues.

AU has several initiatives on the human aspects of climate related risks in the past as well as the present. One of the projects are C3NET – the Climate | Culture | Catastrophe Network with the aim of bringing together an interdisciplinary team of researchers concerned with the human impacts of climate change and extreme environmental events in the past – as well as in the present and future. C3NET aims to create and catalyze a Palaeoenvironmental Humanities research, education and outreach cluster at Aarhus University and beyond.

AU has an interdisciplinary Centre for Environmental Humanities (CEH), that is concerned with re-engaging the environment in disciplines such as history, religion, literature and media, ethics, archaeology, anthropology, education, and artistic practice as ways of understanding and communicating climate change and increasing climate and geo-literacy. Numerous externally- funded projects in archaeology (e.g. EU Life, DFF, Carlsberg) are concerned with past human-environment relations and hence contribute to our understanding of shifting baselines and our stock of knowledge with regards to the diversity of these relations over time.

The Danish School of Education at AU has conducted research on the role of education in relation to climate change and sustainable development.

8.2.6.3 University of Copenhagen

The University of Copenhagen is involved in a number of research projects related to new technologies e.g. for renewable energy, including biofuels. Furthermore a number of projects and research areas have focus on adaption to and effects of climate change.

The University of Copenhagen is exploring the options for adaptation of cities to climate change by means of blue-green approaches and exploitation of ecosystem services. This research includes principles for redesign of the blue-green infrastructure for storage, infiltration and evaporation of stormwater runoff, for buffering of the urban heat island, and for biodiversity support, as well as the development of new technologies for treatment of stormwater runoff to high quality water for reuse purposes. The research and innovation activities further encompass description and assessment of urban planning concepts for climate-change adaptation in Denmark, China and Africa.

Another research theme at the University of Copenhagen, Department of Geosciences and Natural Resource Management (IGN), is climate-change adaption in the Danish municipalities. Main focus is on performance, drivers and barriers within the following fields: mapping of flooding threats, adaptation policies and planning, implementation and management strategies as well as attitudes and collaboration between the different sectors and stakeholders: politicians and planners from the different authorities as well as the citizens.

Numerous research projects at IGN address issues related to sustainable biomass production, both in forestry and in cooperation with other departments related to agricultural biomass production. The use of biomass, the land use and land use change (including ILUC) is an integrated part of several these projects. Topics related to conversion of biomass to energy – solid or liquid – are directly related to the processes of moving towards a bio-based society and economy.

The response of tree species to climatic change, the endurance, adjustment and tolerance of species and the resilience of forest ecosystems, as well as the expected influence on productivity and ecosystems services of forests are important research topics at the forest, nature and biomass section of IGN. The implications for development of wise management strategies, including options for sustained and increased biomass productivity and carbon pools, are an important part of the research and development activities. The carbon pools, the dynamics over time and scale are core topics in a number of research projects, including development and testing of efficient inventory and sampling methods, utilizing both field data and remote sensing.

IGN carries out research on both mitigation and adaptation in developing countries. Within the framework of an IGN-led EU-funded I-REDD project, the effects of the REDD+ mechanisms are being studied in SE Asia, and in collaboration with UNEP-DTU, possibilities of options for renewable energy have been explored in Mali[5]. In a Danida-funded project, improved adaptation to climate change, making better use of outputs from regional climate modelling and seasonal forecasting, is being studied in West Africa, in collaboration with DMI and AGRHYMET in Niger.

The Department of Plant and Environmental Sciences (PLEN), University of Copenhagen, focuses on developing methods to reduce greenhouse gas emissions from different agricultural production systems, depending on both application of mineral and organic fertilisers, irrigation strategies and choice of crops in both temperate and tropical production systems. A special focus area in a number of research projects is agricultural and urban organic waste recycling technologies, including anaerobic digestion for biogas production and upgrading of residues for biofertilizer production in both intensive and extensive agricultural systems (e.g. http://www.reusewaste.eu, http://biochain.dk, http://www.susane.info). Advanced agroecosystem models and life cycle assessment models are being used to investigate and compare the effects on global warming potential of alternative technologies.

The UN CGIAR headquarters of Climate Change and Food Security (CCAFS, http://ccafs.cgiar.org/) is located at PLEN. A member of the Department sits in the Science Board of the JPI on Food Security, Agriculture and Climate. The Department also studies the food systems of cities and has developed new identity metrics to calculate GHG emissions linked to food demand and supply for 9 billion people.

Together, the PLEN and IGN departments play a key role in national and international research initiatives to develop renewable biofuels for climate-change mitigation. The research focuses on sustainable intensification of the productivity and quality of biomass for different bioenergy purposes (http://www.bio4bio.dk). These activities are combined with targeted improvement of biomass feedstocks for new energy applications (e.g. maritime fuels; http://b21st.ku.dk/) and for use in biorefineries (http://biovalue-spir.ku.dk).

At the Department of Biology, research on freshwater streams and lakes is carried out in the light of increasing temperature as well as changes in precipitation patterns. Issues like increased brownification of freshwaters and also increased nutrient mobility in groundwater and surface waters are covered. The research has lately been supported by the VILLUM Foundation via the Centre for Lake Restoration and Aage V Jensens Naturfond.

8.2.6.4 GEUS

GEUS is researching impacts on the Arctic environment, and the driving forces for natural climate variations in long-term perspectives.

In cooperation with other countries, GEUS participates in EU-funded projects, in which the possibilities for finding geological storage possibilities near the European power stations and large industrial CO_2 point sources are being studied. Technical-economic models are also being developed in this project for planning and price calculations of different combinations of sources of CO_2 emissions, transport, and types of geological storage. Several geological formations in Denmark are known to be suitable for deposition and GEUS has identified and mapped potential storage sites and estimated the storage volume.

GEUS is also participating in the international research project CO2STORE, a continuation of the SACS project, in which CO_2 deposition from the Norwegian Sleipner gas field is being further developed. GEUS is studying the geological properties of the storage, including the extent of the sand formation, the tightness of the clay seal and the chemical effects of storing CO_2 in the form of carbonic acid at low acidity.

As a significant outcome of the Energy agreement in spring 2012 GEUS has established an open Geothermal Energy portal, where users – including local and national authorities and industry – can find a comprehensive amount of data and information regarding prospective areas, depths and qualities of aquifers. GEUS has further contributed with local geological models assessing the potential in a number of geothermal license areas and has established numerical models for production capacity.

GEUS is investigating the possibilities of using deep-sited aquifers for energy storage for mitigating seasonal fluctuations in production and consumption. Also shallow geothermic energy and heat storage applications are being developed and exploited.

8.2.6.5 Technical University of Denmark (DTU)

The Technical University of Denmark (DTU) is in the international top league in research and development of sustainable energy technologies covering all major areas related to a shift from fossil energy sources to renewable energy technologies. More specifically, DTU's research covers exploitation of renewable energy sources and development of new energy technologies; conversion and storage of energy; development and control of energy systems; and insight in patterns of energy consumption.

DTU is strong in development and implementation of wind farms; utilization of biomass (gasification, bioethanol production, biogas upgrade, biofuels and biochemicals) and utilization of solar energy (photovoltaics, photo catalysis and concentrated solar power (CPS)). DTU develops technologies for conversion and storage of energy (e.g. fuel cells, electrolysis cells, batteries, magneto-caloric cooling and heating, thermal energy storage, biofuels and carbon capture storage (CCS)), new concepts for sustainable transport and energy saving building and cities.

DTU has expertise in developing and managing future energy systems capable of handling large amounts of energy from intermittent energy sources such as wind and solar and concepts for smart cities to optimize the use of renewable energy technologies.

DTU engages in research on the linkages between the uses of cleaner energy technology and its impact on the climate and development processes. Through the UNEP DTU Partnership, DTU supports implementation of policies and strategies in developing countries that provide access to cleaner and more efficient energy technologies. DTU has long standing experience and methodologies to facilitate energy technology transfer, identifying and overcoming political, institutional and financial barriers to increase use of these technologies.

Further, DTU carries out analysis, research and technical assistance on emerging mitigation policies, strategies and instruments, increasingly in the context of Nationally Determined Contributions (NDCs) as defined through the Paris Agreement. UNEP DTU Partnership has also supported the development of Nationally Appropriate Mitigation Actions (NAMAs) in a multitude of countries, and even earlier it has been key supplier of guidance on the Clean Development Mechanism (CDM) under the Kyoto Protocol. DTU provides institutional and technical capacity building in Asia, Africa and Latin America through various in-country activities in close collaboration with local counterparts.

DTU also carries our research on methodological frameworks for assessing the social and financial costs and benefits of climate-change adaptation measures at project and sector levels. The aim is to help expand the knowledge base on the costs and benefits of addressing climate-change through both mitigation and climate resilience strategies.

DTU's activities moreover include research in linking technology transfer to underlying economic forces, as well as developing tools to assess the benefits and costs of technologies needed to adapt to climate change. This involves methodology development and technical assistance related to identification, assessment and prioritization of technologies for climate-change adaptation..

DTU is active in the research to improve wind resource estimation and wind power integration. These wind energy research fields are reflected in a number of international projects involving in-country national research centres, government departments and companies in the energy sector. There is a capacity building component to these projects, so that delivery of new data is coupled to competences to apply the data to give best value. DTU has worked with IRENA to create a wind energy costing tool, expected to be launched in the near future. DTU is currently working with the World Bank to make a significant update to the Global Wind Atlas dataset and website. This initiative is seen as an important platform and partnership, to bring wind resource data into the public domain, and increase accessibility for subsequent analysis for national planning purposes.

DTU provides researched-based consultancy in renewable energy system integration, planning and policy to the energy sector in countries like e.g. China, South Africa and Mexico. Likewise, DTU leads prominent IEA expert groups, including the Energy Aystem Technology Analysis Program (ETSAP) and the Experts Group on R&D Prioritisation and Evaluation (EGRD). In the area of wind energy, DTU is coordinating member on a number of IEA tasks and a member of several more.

DTU Wind Energy is leading the European Energy Research Alliance (EERA) Joint Programme on Wind Energy. The alliance works on influencing the European research agenda. It has also several members on the IEC standards committees, influencing and aligning how the latest science can be implemented into reliable wind energy technology. Furthermore, DTU Wind Energy is seeking to have an author contributing to IPCC reporting on the topic of wind resources in Energy Systems.

8.2.6.6 Roskilde University

The university's Department of People and Technology (IMT) is involved in the evaluation of technical, economic and environmental aspects of biofuel production. Research focuses on energy crops and algae cultivation for transformation to bio fuels. The research is based on utilizing sewage water to increase productivity, and it examines effects on CO_2 and nutrient removal. Activities include participation in the Baltic Sea Bio-Energy Promotion Programme (EU Interreg Programme with 36 partners) and in Cluster Biofuel Denmark, which is a technology platform bridging the gap between private enterprises, universities and public authorities.

Another research theme is Climate Change and Innovation in the Building Sector, and this is being conducted in cooperation with the Technical University and many others. In this context, the energy and environmental challenges for building and renovating in the future are being addressed.

8.2.6.7 Aalborg University

In the transformation of low-carbon, renewable energy from alternative to mainstream, Aalborg University has made crucial academic contributions. By 2017, some 400 energy researchers at AAU are engaging a very wide range of academic disciplines in flagship projects within the fields of renewable energy, energy-efficiency, and smart energy systems. All of these activities are carried out in close collaboration with partners such as private businesses, public organizations or NGO's.

AAU has a long-standing tradition for research paving the way for the smart energy systems of the future and the present, both from a system as well as from a technological perspective. Since 2012 Aalborg University has led the creation and elaboration of the "Heat Road Map Europe" (funded by FP7 and Horizon 2020), a catalogue of strategies for greener heating and cooling in Europe. Heat Road Map Europe has delivered a host of data, tools, and methods for the analysis of energy systems, heat savings, and district heating and cooling on a European level. Considered the main provider of recommendations for these areas by the European Commission, the results from Heat Road Map Europe have been utilized directly in the configuration of EU strategies for heating and cooling.

Closely related to these prominent contributions are a variety of efforts to develop models, strategies, and technological solutions and designs to the integration of heating/ cooling, gas, and electricity. Particularly challenging is the integration of renewables into the energy system. From a technological perspective, projects like SmartC2Net and RemoteGrid (funded by FP7 and the Danish Energy Technology Demonstration Program respectively) have provided groundbreaking progress in these areas. A world-leading ICT research institution for decades, AAU researchers are currently applying insights and know-how from the disciplines of smart cities, artificial intelligence, machine learning and Internet-of-Things on these designs for the smart energy system. Research into the storage of energy from renewable sources shows great potential as AAU researchers are utilizing the experiences and competencies acquired from long-term research and development within thermal energy technology and especially fuel cells and hydrogen technology. These new technologies are expected to radically impact the carbon footprint of the transportation sector as they point towards greener fuels.

Research within renewable, low-carbon energy technologies (wind, wave, PV) has in itself been prioritized heavily for decades at AAU. In recent years, however, combined efforts towards the challenge of providing cost-effective and reliable offshore wind energy have been at the heart of many research environments at AAU. In prominent publicly funded research and innovation projects, research is being conducted on the design of the components of the wind turbine system: the blades, the mechanical parts (including e.g. nacelle and hub), and the substructure (i.e. various types of foundations). Furthermore, the development of research-based models for leaner and greener manufacturing processes and transportation of components are highly requested by AAU's business partners. New solutions for grid connection and the control of the wind farms are being investigated and validated by AAU researchers. Approximately 100 PhD's and Post Docs are engaged in wind energy research at Aalborg University.

Enhancing the efficiency and reliability of green energy technologies, power electronics is a crucial part of the green transition. Through large-scale, state-of-the-art research and demonstration projects ("Intelligent Efficient Power Electronics"

(2012-2017) and “Center for Reliable Power Electronics” (2011-2016)), AAU has manifested its position as a world-leading hub for development of power electronics, the part of the energy system where electricity from e.g. wind turbines or PV solar cells is converted to electricity usable for households, transportation vehicles etc.. Currently, the “Advanced Power Electronic Technology and Tools” (funded by the Innovation Fund Denmark) project aims at preparing for a paradigm shift in power electronics that will boost the spread of smart and low-carbon, electrical energy systems.

Since 2009, the Strategic Research Centre on Zero Emission Buildings has developed integrated, intelligent technologies for buildings, which ensure significant energy savings and optimal use of renewable energy. In close collaboration with the industry, the center delivers the necessary basis for long-term sustainable development in construction. Supplementing the knowledge and knowhow from building research by insights from material technology, information technology and sensor technology, the center develops new intelligent building components and building systems. These systems and components are able to adapt their function and characteristics in proportion to the current need, to the users’ behaviour, and to the renewable energy production, and in that way to eliminate both the need of fossil fuel and fulfil the users’ demands on the function and the indoor environment of the building.

8.2.6.8 University of Greenland

Ilisimatusarfik, University of Greenland is managed by a Board of Governors and a Rector under the Ministry of Education, Culture, Research, and Church in the Government of Greenland and is established under Act of Greenlandic Parliament no. 19 of 19 of November 2007 on Ilisimatusarfik.

The Institute of Social Science, Economics & Journalism and the Institute of Culture, Language & History at Ilimmarfik Campus, Ilisimatusarfik, University of Greenland, covers social sciences and humanities. Ilisimatusarfik is involved in a series of activities which include focus on climate change, including specific courses with a focus on climate change offered at BA and MA levels.

The Climate and Society programme
The Climate and Society programme links Ilisimatusarfik/University of Greenland and the Greenland Climate Research Centre (GCRC) and focuses on issues of pressing contemporary concern for society and environment in Greenland. The research and teaching of The Climate and Society programme is at the intersection of social science, climate science and public policy. An important aspect of the work is concern with understanding climate change within the context of other changes and societal and economic transformations in Greenland, including resource development and extractive industries. Rapid social, economic and demographic change, resource management and resource development, anti-hunting campaigns, trade barriers and conservation policies all have significant implications for human security and sustainable livelihoods in the Arctic. In many cases, climate change magnifies existing societal, political, economic, legal, institutional and environmental challenges that people experience and negotiate in their everyday lives.

The research projects nurture new knowledge about human-environment relations, economic activities; environment and climate change in Greenland in both historical and contemporary perspective, and contribute to social scientific approaches to climate change more generally.

The Climate and Society programme is a foundation for formal educational links between GCRC and Ilisimatusarfik. It contributes to teaching of undergraduate students and supervision of graduate students at Ilisimatusarfik at both Master's and PhD level.

The Climate and Society programme employs a professor, researchers and PhD students. The current main projects under the Climate and Society programme are:

• Inuit Pinngortitarlu—Nuuk Fjord Monitoring and Mapping Project;
• Climate Change and Extractive Industries;
• Kalaalimernit: Greenlandic Foods, Cultural Identity and Climate Change;
• A Millennium of Changing Environment in the Kangersuneq and the Kapisillit Fjord System, West Greenland;
• Greenlandic Communities, Ice and Living Resources; and
• Climate Change, Policy and Governance.

Major Projects

Researchers at Ilisimatusarfik are involved in the following major projects:

- Marpart (Maritime Preparedness and International Partnership in the High North) is an international research project including nine universities and research institutions in Iceland, Norway and Russia. The main purpose of the project is to assess the risk of the increased maritime activity in the Arctic and the challenges that this increase may represent for the emergency prevention, preparedness and response institutions. The starting point of the project is the increased maritime activity in Arctic waters and the vulnerability related to human safety, environment and vessels or other physical installations at sea. The activities in focus are intraregional and interregional transportation, exploration and exploitation of oil and gas and mineral resources, fisheries and cruise tourism. The challenges in the Arctic for maritime operations are limited infrastructure, low temperatures with ice and icing and a vulnerable nature.

- Qimmeq Greenland's Sled Dog is a Greenland Perspective project under the aegis of the University of Greenland, the Natural History Museum of Denmark and the University of Copenhagen. Today, Greenland holds the Arctic's largest remaining sled dog population and a globally unique traditional dog sled culture. But both the sled dog and the culture that goes with it are threatened by extinction. Even though sled dogs are iconic and dog sled culture plays an essential role in Greenland and despite the subject holding great scientific interest only limited systematic work has previously been done on these matters.

- ARCTICCHALLENGE is an international project focusing on Arctic petroleum development as a challenge to societies: A comparative look at Norwegian, Greenlandic and US case sites. ARCTICCHALLENGE investigates the increased need for energy as a major challenge to society, and therefore to politics, in our time, and the effects on local lives in communities in the Arctic. The project will significantly increase the understanding of the complexities embedded in securing a viable future at the local level in the Arctic, by focusing on local, culturally based perceptions of petroleum development and climate change in shaping such security

- SLiCA (Survey of Living Conditions in the Arctic) is an international joint effort of and a partnership between researchers and indigenous peoples to measure and understand living conditions in the Arctic including the effects of climate change.

Results on climate issues gathered through the ongoing research and monitoring efforts are also communicated in local and international fora.

8.2.6.9 University of the Faroe Islands (Fróðskaparsetur Føroya)

The University of the Faroe Islands (www.setur.fo) does not run systematic observations, except for some project specific short-term measurement campaigns. Climate and climate change is touched upon in educational programs at the University. Renewable energy sources, as e.g. wind energy is part of activities in research and education at the University. Both existing and new weather measurements are, therefore, of high interest and are being used but not produced at the University.

The University cooperated with other Faroese institutions in the 1980's and 1990's about meteorological measurements in the central part of the Faroe Islands. At the same time there was a small project looking into time-series from long-term weather measurements (yearbooks from 1873 and onwards) made in the Faroe Islands by the Danish Meteorological Institute. Limited measurement projects have been conducted in relation to renewable energy, and environmental investigations. Apart from the project described below, no other climate relevant projects are running now.

Project: Climate Change Management and Adaptation Project
The University of the Faroe Islands is participating on a project on climate change adaptation in regions in the Nordic countries as well as with regions in the United Kingdom and Ireland. The aim of the programme is to tackle Climate Change on local and regional levels through increasing public awareness and by using models of best practice to develop Climate Adaptation Plans for local authorities. The project will also develop a preparedness scale matrix for local authorities.

This will be done by analysing and evaluating existing climate change data and issues. The Climate Adaptation Plans developed within the project will identify the risks/vulnerabilities posed by climate change in the short, medium and long terms and will serve as a valuable input as to developing a community resilience to a changing climate.

The project will build solutions to maintain the balance between competing environmental, economic and social interests, and explore models for monetary valuation of climate change adaptation, audit of the economic value in developing the plans and the potential economic costs of not acting, i.e. pay now for preventative measures or pay later following the impacts of climate change.

Other participants are the power company SEV (www.sev.fo) and Tórshavn municipality (www.torshavn.fo), the biggest municipality with a population of roughly 21,000, which equates to about 42% of the total population of the Faroe Islands. The municipality has a strong focus on the environment.

The project will look into the following topics:

- Landslides: The risk of increased landslides due to increased precipitation. There are already indications on vulnerabilities due to land use that is related to sheep density in particular.
- Erosion: Increased erosion (of both rock and soil) may result from increased precipitation, as it leads to more extensive and powerful run-offs, lake streams and waterfalls, increased winds leading to rougher seas, which will have an increased damaging effect on land and, particularly, coastal areas.
- Change in fishery: The fishery may change due to a shift in sea temperature and/or changed ocean currents. In recent years, the most economically important fish stocks have changed from being dominated by demersal fish species to pelagic fish species.
- Downpour: A rise in the amount of precipitation may induce increased pressure on the existing sewerages, which will become a great challenge for the municipalities.
- Storms: More extreme weather will entail new or different challenges to, for example, construction. However, most constructions in the Faroe Islands are strong enough to withstand extreme weather.
- New terrestrial plants and animals: Occurrence of new species are recorded in the Faroe Islands at regular intervals, but there are no publications available on these new findings yet.
- New plant- and animal diseases: (temperature and humidity)
- Coastal management: Measures to protect buildings, roads and harbours from rising sea levels in conjunction with extreme weather.

8.3 Systematic climate observations

8.3.1 Atmospheric climate observations, including measurements of the composition of the atmosphere

DMI carries out continuous monitoring of key weather and climate parameters. In the climate monitoring programme, classic methods of measurement are used and new, satellite-based observation methods are being developed.

DMI operates around 350 automatic measuring stations in the Danish Realm (Denmark, Greenland and the Faroe Islands) with a broad measuring programme ranging from automatic sea level or precipitation stations that measure only one parameter, to stations with a full measuring programme, including automatic cloud height detectors and weather type detectors.

Besides being of use for national programmes, the observations concern Denmark's international contribution in the form of observation components from Danish territory to the worldwide meteorological observation network WWW - World Weather Watch. Other international programmes for mapping weather and climate include the GCOS (Global Climate Observing System), coordinated by the World Meteorological Organisation (WMO). For further details – see Annex H.

The meteorological observations are stored in DMI's database, and observations from several Danish stations are available in electronic form from 1872, water level measurements from 1890, and measurements of the surface temperature of the sea from 1931.

The meteorological observation systems that are of most interest in a climate context are:

- The surface observation system
- The radio sounding network
- The weather radar network
- Satellite data
- The ice observation service

Each of these systems is described in the following, together with DMI's stratospheric observations and oceanographic observations.

Surface observation network
For historical and practical reasons, the surface observation network consists of many different types of stations. Apart from five airbases and airports where there are statutory requirements for manual observations, the network is 100% automated. Table 8.2 provides an overview of the network. DMI is receiving a growing number of observations from cooperation partners in all parts of the Realm, so these are included in Table 8.2.

TABLE 8.2 THE NETWORK OF SURFACE OBSERVATION STATIONS 1 JANUARY 2013

Source: Danish Meteorological Institute

Type	DMI			Cooperation partners		
	Denmark	Greenland	Faroe Islands	Denmark	Greenland	Faroe Islands
Weather stations	43	24	1	27	18	3
Automatic precipitation intensity stations				158		
Automatic acc. precipitation stations	106	5	1			
Manual acc. precipitation stations		1	1			
Surface radiation stations	28	5	1			
Automatic sea level stations	33			aprox 60		

In addition, Denmark is a partner in the EGOS/SURFMAR cooperation on collection of weather observations from ships and drifting weather buoys in the North Atlantic, since DMI has strategically well placed satellite reception facilities in Kangerlussuaq (Greenland) and in Copenhagen. Observations from Denmark, Greenland and the Faroe Islands are also included, and are coordinated with EUCOS (European Coordinated Observation System), which is organised by EUMETNET (European Meteorological Network). As part of the SURFMAR programme, DMI has an observation agreement with four ships, which carry out systematic observations (Automated Voluntary Observing Ships) in the waters around Greenland and between Greenland and Denmark.

The radio sounding network

In radio sounding, a small, fully automatic weather station is sent up by balloon. The balloon can reach a height of about 35 kilometres, and all the way up it sends observations of temperature, pressure, humidity, and wind velocity via radio to a receiving station. Radio soundings provide measurement of the atmosphere's vertical profile for use in analyses of the condition of the atmosphere. They also enable measurement of ozone and radioactivity.

DMI operates radio sounding stations in Tórshavn on the Faroe Islands and in Danmarkshavn, Illoqqortoormiut, Tasiilaq, Narsarsuaq, and Aasiaat in Greenland. Soundings are also received from three so-called ASAP (Automated Shipboard Aerological Programme) containers, which are “portable” radio sounding stations designed for use on ships. DMI has had an agreement for many years with a Greenland shipping company on ship-borne radio soundings in the North Sea and the North Atlantic. The radio sounding stations and the ASAP units take two daily soundings, although the ASAP units do not take a sounding if they are near a land radio sounding station, such as the one in Tórshavn.

Weather radar network

With five radars in Sindal, Virring and on Stevns, Rømø and Bornholm, Denmark's network of weather radars provides 100% coverage, which enables comparison with ground-truth data from a network of land-based precipitation stations.

The weather radar network has a high spatial resolution and is therefore able to provide precipitation-climatological information at a very high degree of detail nationally, regionally, and locally. By calibrating radar data against surface-based point-precipitation measurements, the latest research results show that good absolute accuracy can be achieved. The present radar network has a data frequency of six data sets per hour and the spatial resolution is 2x2 km^2.

Satellite data

Denmark contributes to space-based observations through membership of the European Space Agency ESA and the European meteorological satellite organisation EUMETSAT, and DMI has facilities for receiving satellite data in Denmark and Greenland.

In cooperation with EUMETSAT, DMI is managing the so-called satellite Application Facility (SAF) for use of GPS data for weather and climate monitoring (ROM-SAF) and is also participating in SAF for oceanography and sea-ice (O&SI SAF) and the SAF for ozone and atmospheric chemistry monitoring (O3M SAF).

Ice observation service
DMI is responsible for systematic monitoring of the ice conditions in the waters around Greenland. Observations of the ice conditions have been collected for about 140 years, and there is a very large quantity of data in graphic form such as monthly surveys, ice maps, etc. Since 1959 the waters south of Kap Farvel, in particular, have been intensively monitored with satellites and aircraft for provision of ice information to shipping. Ice maps are prepared and distributed frequently with detailed information on relevant ice conditions. All new ice maps are in vector and graphic form. Since 1999 weekly maps have been prepared showing the ice conditions all the way round Greenland. All offshore maps are based on satellite data DMI is carrying out research in sea ice modelling, satellite-based iceberg detection and in mapping the extent of sea-ice through the past centuries.

Measurements of pollen and spores
In Denmark the Danish Asthma and Allergy Association (Astma-Allergi Danmark) is responsible for the pollen project and operate two routine stations measuring allergenic pollen and spores in Copenhagen, Zealand, at the DMI (55°43´N, 12°34´E) and in Viborg, Jutland, at Viborg-Kjellerup Hospital (56°27´N, 9°24´E). The measurements started in Copenhagen in 1977 and are performed utilising Burkard traps placed 15 and 21 meters above ground level, respectively. The distance between the two stations is about 220 km. In different periods, campaign measurements have been performed at different stations in Denmark..

8.3.2 Stratospheric observations

Measurements of the ozone layer and UV radiation are made at Copenhagen and Kangerlussuaq (Søndre Strømfjord), using Brewer ozone spectrometers. In Kangerlussuaq is also located a SAOZ spectrometer and an Aeronet Sun Photometer. In order to monitor the ozone depletion in the lower stratosphere in the winter and spring months, and with a view to establishing an ozone profile climatology, since 1989 DMI has been launching ozone probes from a number of stations in Greenland. Since January 1993 ozone probes have been launched on a weekly basis from Ittoqqortoormiit (Scoresbysund) on the east coast of Greenland. Ittoqqortormiit is as of now the only DMI ozone sonde launching station in Greenland. In Ittoqqortoormiit is also a SAOZ spectrometer, an Aeronet Sun Photometer and a UV broadband instrument installed.

The observatories operated by DMI in Greenland in Kangerlussuaq and Ittoqqortoormiit, are Arctic stations in the Network for Detection of Atmospheric Composition Change (NDACC). This is a worldwide network of measuring stations equipped with standardised instrumentation of verified high quality for monitoring the condition of the stratosphere and the processes that affect the ozone layer. NDACC is supported by the International Ozone Commission (IOC), UN Environment and WMO, and DMI takes part in the NDACC steering committee (http://www.ndacc.org). Besides, the radiosounding station in Narsarsuaq is also hosting an Aeronet Sun Photometer.

The DMI measurements are reported to the NDACC database) and the database of the World Ozone and UV-radiation Data Centre (WOUDC) under the WMO programme Global Atmosphere Watch and are used to validate satellite data as well as to compare with results from climate models.

8.3.3 Oceanographic climate observations

DMI develop and uses satellite remote sensing of sea surface temperature and height, as well as ice concentration, drift, thickness and surface temperature for climate observations.

DMI cooperates with the Danish Coastal Authority and local authorities to monitor the sea level at a number of Danish localities.

DMI operates operational current-monitoring stations in the Danish Straits.

DMI integrates in-situ observations, satellite observations and ocean and sea ice models to simulate the present oceanic climate around the Denmark, Greenland and the Faroe Islands. The models assimilate observations and/or are validated using observations.

DMI has for several spring seasons operated a flexible observational platform of ocean, ice and atmospheric conditions on the sea ice off Qaanaaq, Greenland.

In addition, DMI operates several research driven monitoring programs.

8.3.4 Terrestrial observations related to climate changes

Monitoring of snow cover, sea ice and surface radiation is reported in sections 8.3.1 and 8.3.2 and observations of the Greenland Ice Sheet in section 8.3.5. Denmark does not carry out further terrestrial observations that can be related to climate change, but Denmark's climate-related research (cf. 8.2) includes monitoring and studying the effect of terrestrial conditions – e.g. the continuous monitoring of forests structure and function performed by the University of Copenhagen for the Ministry of Environment.

As mentioned in Section 8.2.4.10, the Greenland Institute of Natural Resources (GINR), Danish Centre for Energy and Environment (DCE), and Asiaq, Greenland Survey are in charge of monitoring the effect of climate change on nature and the environment in Greenland on the basis of the Greenland Ecosystem Monitoring (GEM). The GEM is also further described in Section 8.2.4.10.

8.3.5 Observations of the Greenland Ice Sheet

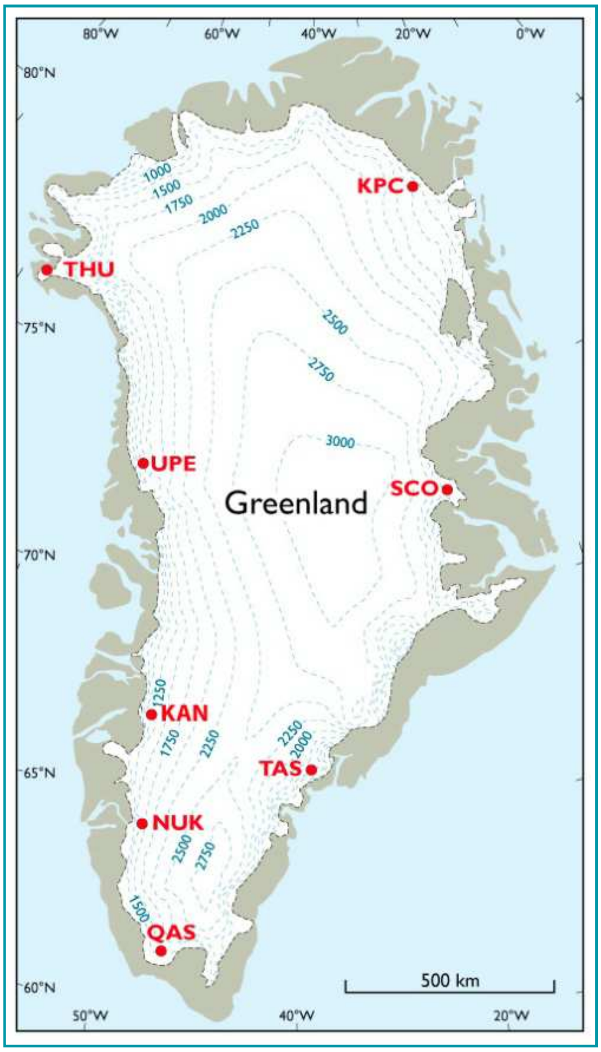
GEUS has since 2007 operated the Programme for Monitoring of the Greenland Ice Sheet Margin (PROMICE), funded by the Danish Ministry of Climate, Energy and Building through the DANCEA programme. Partners are the Greenland Survey (ASIAQ) and the Danish National Space Centre at the Technical University of Denmark. The objective is to monitor the mass loss of the Greenland Ice sheet.

The monitoring programme includes:

1. An extensive network of eight automatic weather stations (AWSs) in the ice sheet surface in proximity of the ice sheet margin (see figure 8.1). The stations measure the climate parameters and the surface melt.
2. Repeated airborne surveys of the entire ice margin to obtain surface elevation and ice thickness (2007 and 2011).
3. An ongoing effort to determine ice sheet surface velocity from satellite radar data and in situ GPS.
4. Modelling of the surface melt and dynamic mass loss of the Greenland ice sheet.
5. Regular mapping of area and elevation to determine mass loss of individual glaciers and ice caps surrounding the ice sheet.
6. Maintenance of an open-access database (www.promice.org).

FIGURE 8.1 LOCATION AND IDENTIFICATION CODES OF PROMICE AUTOMATIC WEATHER STATIONS. DOTTED LINES ARE ELEVATION CONTOURS IN M ABOVE SEA LEVEL.

Source: Geological Survey of Denmark and Greenland



GEUS also operates the GlacioBasis monitoring programme of the A.P. Olsen ice cap within the GEM (Greenland Ecosystem Monitoring) framework, which is a comprehensive environmental long-term monitoring programme at Zackenberg in

Northeast Greenland. The programme is funded by the Danish Ministry of the Climate, Energy and Building through the DANCEA programme.

Other programmes related to the PROMICE monitoring are:

- Participation in the worldwide effort to monitor land ice masses, Global Land Ice Measurements from Space – GLIMS. Within this framework, GEUS acts as the GLIMS Regional Centre for Greenland (RC1) and formally coordinates the GLIMS activities in Greenland through contact with regional stewards working in different parts of Greenland. GEUS actively works to submit data to the GLIMS database within PROMICE.
- Involvement in the European Space Agency (ESA) projects GlobGlacier (global ice extent), ESA Climate Change Initiative Ice Sheets (ice velocities and surface elevation changes) and CryoClim (surface types), The Nordic Centre of Excellence - Stability and Variations of Arctic Land Ice (SVALI) and the Greenland Climate Research Centre project Impact of Glaciers near the Coast (IMGLACO).

8.3.6 Systematic observations in Faroe Islands

A number of systematic observations are made in the Faroe Islands in relation to climate, mostly on hydrography (responsibility: FAMRI, see Chapter 8.2.4.10) and on weather stations (responsibility: LV) cf. Table 8.1.

TABLE 8.1 OVERVIEW OF CLIMATE OBSERVATION SYSTEMS IN THE FAROE ISLANDS.
Source: FAMRI, LV and VØRN

Observations, type	Responsibility
Hydrography • Conductivity, Temperature and Depth (CTD) measurements are obtained along six standard sections extending out from the Faroe Shelf, typically three times a year. • Current measurements (speed, direction) in the Faroe Current (Atlantic Water inflow) and the Faroe Bank Channel (Nordic Seas overflow). • Annual biological oceanography cruise in late April on the Faroe Shelf. Main observations: chlorophyll a, zooplankton and CTD. • Annual 0-group survey in late June on the Faroe Shelf. Main observations: commercially important juveniles, zooplankton and CTD, chlorophyll a, nutrients. • Coastal station Oyrargjógv: Temperature. • Coastal station Skopun: Temperature, salinity, chlorophyll a, nutrients.	FAMRI
Hydrography • Automatic sea level and temperature measuring stations. • Wave measuring buoys (wave-height, wave periode, wave direction and sea temperature).	LV
Atmospheric • Automatic weather-stations measuring: o Wind direction, wind speed, air-temperature, pressure, humidity and rain intensity.	LV
Atmospheric • Weather balloon launches • Automatic weather stations measuring: Wind direction, wind speed, air-temperature, pressure, humidity, rain intensity and sun hours.	VØRN (DMI until 1/4 -2009)

The Road Authority Faroe Islands (LV or LANDSVERK, www.lv.fo) carries out continuous monitoring of key weather and climate parameters. Classic methods of measurement are used.

Landsverk operates 27 automatic weather-measuring stations. Measurements for most of the stations go back to 2006, but for some back to 1998. The weather stations measure wind direction and wind speed (10 min mean wind three sec. Gust), air temperature, pressure, humidity and rain intensity. Many of the stations also measure road temperature, water on road, ice on road and salt on the road. The raw data is used for many purposes. Among others: Building projects, time estimation, evidence in damage, accident incidents, climate investigations, air traffic investigations.

Landsverk operates six automatic sea level and temperature measuring stations and four automatic wave-measuring buoys. The wave-measuring buoys measure among other things: Wave height, wave period, wave direction and sea temperature.

Apart from conducting inspection on fishing vessels, registrations on catch and other tasks, the Fisheries Inspection (VØRN, www.vorn.fo) has since 2009 conducted a number of systematic climate observations, formerly done by DMI (Danish Meteorological Institute). VØRN launches weather balloons and is responsible for a number of weather stations.

8.3.7 Development assistance for establishment and maintenance of observation and monitoring systems

From 1997 to 2004 DMI participated in a development project together with the meteorological institute of Ghana (Meteorological Services Department - MSD). The purpose of the project included re-establishing a network of meteorological stations in the country, thereby ensuring collection of data. At the same time, it was to improve communication and use of the collected data. The project was completed in 2004. At the end of the project, MSD had an efficient network of around 300 observation stations registering the usual meteorological parameters.

DMI also coordinated the project 'Use of climatic seasonal forecasts to improve cultivation strategies for crops in West Africa'. The purpose of this project was to examine the possibilities for adapting cultivation practice for a selected agricultural crop (peanuts) in Ghana, using the best available seasonal forecasts for the climate. The project was funded by the Council for Developing Country Research (RUF).

In 2004 DMI and AGRHYMET in Niger prepared a proposal for a project on the use of satellite data and preparation of seasonal forecasts. However, contrary to expectations, the necessary project funds will probably not be available.

From 2000 to 2005, in cooperation the Latvian Hydrometeorological Agency DMI developed an operational system for monitoring degree-days in Latvia. The project was supported by the Danish Energy Agency.

From 2009 to 2013 twinning activities between Danish Meteorological Institute (DMI) and Zambia Meteorological Department (ZMD) were carried out. At the initiative and support of the Royal Danish Embassy in Zambia, DMI helped ZMD to address the challenges at the ZMD in climate monitoring/modelling as well as in the dissemination of weather/climate products.

In the period 2013 to 2014 DMI provided meteorological consultancy services for the national water sector reform studies for Gambia. The project was supported by the African Development Bank/African Water Facility.

From 2012 to 2014 DMI participated in a climate-adaption project in West Africa to optimize the observation network, strengthen the capabilities for data management and analysis, improve processing and analysis of satellite data, improve hydro-meteorological forecasts, develop climate scenarios and update communication strategies. The project was supported by the Danish Development Assistance Programme (Danida).

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[1] *The Ministry of Science, Technology and Innovation, Coordination Unit for Research in Climate Change Adaptation and the Ministry of Climate and Energy, 2009:* Mapping of Climate Research in Denmark (in Danish).

[2] https://ufm.dk/publikationer/2017/forsk2025-fremtidens-lofterige-forskningsomrader
[3] http://www.jpi-climate.eu/home
[4] http://www.jpi-climate.eu/ERA4CS
[5] http://www.frsemali.org/

9

EDUCATION, TRAINING AND PUBLIC AWARENESS

9 Education, training and public awareness

Denmark has a long tradition for involving the public in the environment field. This tradition was followed up by an international agreement - the Aarhus Convention from 1998. On climate change, anthropogenic greenhouse gas emissions and political reactions in terms of policies and measures there is an ongoing public debate in the media and elsewhere. A considerable amount of information on climate change and Danish policies is provided on the websites of the Ministry of Energy, Utilities and Climate (www.efkm.dk), the Danish Energy Agency (www.ens.dk), the Danish Meteorological Institute (www.dmi.dk), the Geological Survey of Denmark and Greenland (www.geus.dk) and on the websites of other relevant ministries and the institutions such as the Ministry of Transport, Building and Housing (www.trm.dk), the Ministry of Environment and Food (www.mfvm.dk), the Ministry of Taxation (www.skm.dk) and the Ministry of Foreign Affairs (www.um.dk).

In 2008 and 2009, numerous new initiatives on education, training and public awareness regarding climate change issues were taken with a view to support Denmark's role as host for the 15th Conference of the Parties to the UNFCCC 7-18 December 2009 in Copenhagen. Although some of these initiatives were project-based and limited in time, several of the initiatives continue now as part of the ordinary curricula in elementary schools, secondary school, high schools and at universities.

9.1 EDUCATION AND POSTGRADUATE EDUCATION PROGRAMMES

The education system in Denmark has a long-lasting tradition and practice in preparing and empowering students to live, learn, work and participate in a society with freedom and democracy. The overall management and democratic learning culture of schools combined with the framework curricula and learning objectives of all subjects provide the basis for pupils and students to develop necessary knowledge and skills to contribute to sustainable development, peace, human rights and global citizenship, in line with the Sustainable Development Goal for quality education for all, SDG 4.

Below further information in relation to education on climate change is provided.

9.1.1 Primary, lower and upper secondary education

Primary and lower secondary education

Information on climate change and sustainable development in general for teachers involved in primary and lower secondary education is available on a website under the Ministry of Education (www.emu.dk).

Among the most recent dedicated products targeted at elementary school is "Production with sustainable exploitation of the natural environment" (http://www.emu.dk/modul/f%C3%A6llesfagligt-fokusomr%C3%A5de-produktion-med-b%C3%A6redygtig-udnyttelse-af-naturgrundlaget) i.e. geography, (http://www.emu.dk/omraade/gsk-l%C3%A6rer/ffm/geografi).

Other relevant websites targeted at primary and lower secondary school are "The Ice School" (http://isskolen.dk/wp/?page_id=4758), "The Polar Portal" (http://polarportal.dk/forsiden/) and "DR School – Geography, Climate Changes" (http://www.dr.dk/skole/geografi/klimaaendringer). "The Ice School" offers complete e-learning materials on the Greenland ice sheet for 6th to 10th grade. "The

Polar Portal" focuses on Arctic climate change and its regional and global importance. The Danish Broadcasting Corporation's website "DR School – Geography, Climate Changes" provides teaching materials on climate change in pictures, sound and videos.

Furthermore Denmark has a dedicated network of schools participating in UNESCO's Associated Schools Project Network. Following the adoption of the SDGs in 2015 a number of these schools have embarked on a new flagship project, initiated by UNESCO: "A Whole School Approach to Climate Change and Sustainable Development." This project involves both primary, lower secondary and upper secondary schools, teachers and pupils – and their communities.

Upper secondary education

Sustainable development has been a part of Danish upper secondary education for a number of years. The reform of upper secondary education, which was launched in august 2017, has a strengthened focus on sustainable development.

The purpose of the education is stated in §1 of the law for upper secondary education. In this paragraph it is stated that "*Students should therefore learn to relate reflectively and responsibly to their surroundings: fellow human beings, nature and society as well as their development*".

Aspects of sustainable development appear in the syllabus of several subjects e.g. biology, physics, chemistry, physical geography, design and architecture, social science, technical science and it can be included in multi-subject coursework. The Global Goals for Sustainable Development (UN 2015) is specifically mentioned in the syllabus for physical geography and social science.

Information on climate change and sustainable development in general for teachers involved in upper secondary education is also available on the website, www.emu.dk, under the Ministry of Education. Among the most recent dedicated products on the EMU targeted at upper secondary school is "Climate and Living Conditions" (http://www.emu.dk/modul/klima-og-livsvilk%C3%A5r), i.e. physical geography (http://www.emu.dk/omraade/stx/fag/naturgeografi). "Climate and Living Conditions" offers several articles and teaching materials for inspiration about climate around the world.

9.1.2 University of Copenhagen (KU)

Education in climate is an integral part of many educational programmes at the University of Copenhagen. In September 2013, an interdisciplinary two-year MSc programme, 'Climate Change, Impacts, Mitigation and Adaptation' (CCIMA) was started, covering both natural, environmental and social science aspects of climate change (http://studies.ku.dk/masters/climate-change/). The programme includes 16 courses, offered by departments from the Faculties of Science, Social Science and Health, and covering topics from geophysics to political science. All major climate change research groups at KU contribute to teaching, giving the programme a strong research base. Collaboration with other universities, such as DTU, and research organisations, such as DMI, has been established to ensure the strongest possible research basis of the programme. Students may either follow the programme, leading to a 'MSc in Climate Change', or select individual courses as part of other MSc programmes. Since the first year the programme has attracted hundreds of students including many from various European and overseas.

At the Faculty of Law, the MA courses 'Climate Change and the Law' and International Energy Law and Sustainability are offered to MA students.

Other educational programmes with focus on climate are:

- EnvEuro, a two-year Master in Environmental Science, offered by the University of Copenhagen and three other leading European universities within the Euroleague for Life Sciences network. The MSc is focused on soil, water and biodiversity and features an introduction to environmental science, six different specialisations, including a specialisation in climate change, and finally a Master's thesis in environmental science (http://www.enveuro.eu/).
- University of Copenhagen is hosting the master education in Water and Environment affiliated to the Sino-Danish University Center in Beijing. The Master's programme in water and environment focuses on the growing need for innovative and sustainable solutions and better water management systems. Climate and global changes are integrated part of the teaching, in particular 2nd semester the students acquire the necessary tools to deal with data analysis and processing related to water and environment research at different scales in the context of global change.
- The Geophysics specialization of the MSc in Physics programme is offered by the Faculty of Science at University of Copenhagen. The specialization is focused on the Earth and its climate system. 8-10 courses cover the physical description of the climate system, and the one-year research-based thesis can be done in collaboration with research organizations such as DMI or the Geological Survey (GEUS). The number of students graduating is typically >10 per year.
- E-learning course in Climate Change Impacts, Adaptation and Mitigation offered by the University of Copenhagen in close cooperation with the Danish Meteorological Institute, Technical University of Denmark, University of Natural Resources and Life Sciences in Vienna and Australian National University. Focus of the course is climate change impacts and the human response to climate change. The course has been developed by a team of teachers who are international experts within their respective disciplines, including four lead- or coordinating lead-authors on Intergovernmental Panel on Climate Change (IPCC) reports. Through distance learning the course can be followed from anywhere in the world and it is open for MSc students and continuing education students with a relevant BSc background in natural science, social science and economics (www.climate-change.dk).
- Global Environmental Governance (GEG) is a cross-faculty specialization, aiming to equip students with interdisciplinary skills which will assist them in dealing with global environmental governance in an international and/or national context. Focus is on the global and international levels of governance, but with a view to how these levels interact with the regional and local levels.
- Climate Solutions is an interdisciplinary course offered by the University of Copenhagen in collaboration with the Technical University of Denmark. It is open for MSc students and continuing education students with a relevant BSc background in natural sciences, social sciences, humanities, law, economics and engineering. Students are working together in interdisciplinary teams as consultants for private companies and public institutions to perform

accounting of their greenhouse gas emissions and create concrete plans for implementing the most effective and cost-effective solutions for reducing greenhouse gas emissions (www.climate-solutions.dk).

- Summer schools are annually offered by the University of Copenhagen within the area of climate change, often in collaboration with other universities within IARU (http://studies.ku.dk/summer/courses/), and the University of Copenhagen is also contributing to the Climate KIC summer school The Journey (www.journey.climate-kic.org).
- Large and smaller research projects on climate change related topics are continuously initiated and offers sommer schools or other educationally related activities as an element of the research plan.
- Climate change is considered as an element in sustainability courses offered by the faculty of Science.
- Furthermore, a number of other individual courses on climate change is available for continuing education students as single subject courses via open education (www.kurser.ku.dk) and may also be taken in combination as a part of a 60 ECTS Flexible Master in Climate Change and Environmental Management (www.flexible-master.dk).

The universities disseminate widely the results of research, with the portals (http://climate.ku.dk/ and http://climate.ku.dk/research/) as the main entry points. Here, 12 key areas of climate research are listed, including areas of study and contact persons. At the faculty/institute level, a wealth of climate activities within research and education are disseminated, e.g. the Niels Bohr Institute's activities at the website http://www.fys.ku.dk/hco/presse/Formidling2002.htm.

9.1.3 Aarhus University (AU)

There are climate related education programmes at all the faculties. For example there are courses related to the understanding of the climate system and mechanisms of climate change, agricultural production and the impact of this on the climate, courses on tropical ecosystems, management and development, global food production and climate change, global management and manufacturing, and environmental economics and climate change.

AU Department of Law offers a number of courses in climate law or climate mitigation/adaptation-related issues on both bachelor’s and master’s level. On a bachelor’s level a 45-hour course in “Climate-, energy and environmental law” is mandatory for business law students, while a 30-hour elective course in “Renewable energy law” is running every fall. Focusing on exchange students, but also open for Danish students, the Department of Law offers a 38-hours intensive bachelor’s course in “Climate law – international and EU law in context” as part of the AU Winter School Programme and a 40-hours course master course in “Climate law”, which forms part of the AU Summer School Programme. Moreover, climate law forms an integral part of the “Environmental Law” elective course on the master level. The Department is also taking part in the Peoples University with lectures on the Paris Agreement.

The Danish School of Education at AU has conducted research on the role of education in relation to climate change and sustainable development. DanishIn collaboration with Environmental and Sustainability Learning Centre at Rhodes

University in South Africa, they have recently explored how learning can foster change agents and collective agency for climate resilient development.

Climate change issues are highly integrated in the MSc programme on Agroenvironmental Management at Faculty of Sciences and Technology, which contains a course on Carbon Cycling and Climate Change. Climate change is also highly integrated in the Graduate School of Science and Technology and the Agroecology, Biosciences and Environmental Sciences ph.d. programmes at AU.

The Faculty of Business and Social Sciences (BSS) at Aarhus University has set strategic focus on “sustainable growth through innovation” in research, education, communication and cooperation with the business community. More than 50 researchers are working with issues such as regulatory challenges, climate economics, strategies and business models, user behaviour, sustainable supply chain and logistics, responsible investment, CSR etc.

A BScB in Sustainable Business and a BScB in environmental law have been developed.

Department of Archaeology and Heritage Studies offers a MA degree in sustainable heritage management (SHM). The programme provides the students with the knowledge and competencies needed to meet the multiple challenges of contemporary heritage policy, management and research, and taking responsibility for the links between humans, our environment, and the past. Educational programmes in Anthropology also contain elements of environmental studies related to land-use, governance, and political ecology, especially with regards to indigenous peoples.

The AU School of Engineering offers an international graduate programme in Urban Water. The semesters aim at combining traditional engineering skills with environmental process know-how and methods for analysis and engineering of suitable solutions for waste- and stormwater-water management, treatment and discharge, and ground water withdrawal, treatment and distribution. An understanding of the climate and environmental impacts is combined with engineering disciplines in learning how real-life problems of the urban society can be analysed, and how suitable technical solutions can be designed, dimensioned and implemented. The programme is highly relevant in developing practical solutions for water related climate change adaptation.

Aarhus University in collaboration with the Sino-Danish Centre, other Danish universities and the University of the Chinese Academy of Sciences in Beijing offers a Master programme in Water and Environment for Danish and Chinese students in Beijing, China. The programme is focused on finding solutions to the challenge that worldwide freshwater resources are under pressure due to overuse, pollution and climate change.

In addition, Aarhus University carries out a considerable amount of public outreach, including numerous lectures at high schools and primary schools and for the general public. Courses on climate have been organised for school teachers and journalists, and AU has also presented number of papers for the general public, which may be used as teaching material.

9.1.4 Aalborg University (AAU)

Climate change is an integral part of a very large number of educational programs at AAU, reaching from social science through health aspects to technical programs with focus on applications to reduce climate change. Thus, students at AAU generally have in-depth knowledge within a specific (e.g. technical) topic combined with generic knowledge on the wider (e.g. societal) implications. In order to be able to solve the challenges of tomorrow the students need to have knowledge about many aspects of the challenge. This is a key point in all of our educational programs. This is parallel to the future scenarios for competence building required for the transition to a low-carbon, renewable energy system developed by EUA-EPUE (European platform of universities in energy research and education).

The PBL-based pedagogical model of Aalborg University has become both nationally and internationally recognised by universities, researchers and students as an advanced and efficient learning model. Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material. Thus, UNESCO has placed its only Danish Chair in PBL at Aalborg University.

A comprehensive university with both research and education in social science and humanities, health science and medicine, technology and engineering, Aalborg University has more than 25 educational programs covering most aspects of the measures to mitigate climate change as well as the implications of climate change.

Addressing the challenges caused by climate change (e.g. climate adaptation issues or migration), several educational programs offer competences within e.g. societal planning, water & environmental engineering or ICT. A multitude of educational programs also operate within the framework of green energy (low carbon emission energy production, distribution and consumption etc.). Aalborg University offers a variety of specialized energy master degrees, ranging from e.g. sustainable energy planning through thermal energy and process engineering, to mechatronic control engineering. Furthermore, competences achieved through master degrees in more generic engineering disciplines such as structural engineering or bio-technology are very often applied to energy- or climate-related challenges.

Drawing from international experiences and contributing to the development of education and research at a European level, Aalborg University plays an active role in CESAER (the Conference of European Schools for Advanced Engineering Education and Research) – a non-profit international association of leading European universities of science and technology and engineering schools/faculties at comprehensive universities and university colleges.

9.1.5 Technical University of Denmark (DTU)

Engineers graduating from DTU are expected to be able to translate technological needs or demands into a set of sub-problems, and to design, calculate and construct complex solutions. Engineers from DTU are expected to contribute to the development of technological solutions that respond to the global challenges, and therefore, students at DTU are trained in conceiving, designing, implementing and operating sustainable solutions throughout their education. The vital role of sustainability is formally expressed in DTU's Strategy:

> "*DTU's study programmes will be designed to ensure that sustainability is an integrated part of all courses. Similarly, all students will complete programme components intended to boost skills in innovation and entrepreneurship*".

Thus, climate change challenge and climate change technologies are addressed as an integrated part of all BSc and MSc programmes and a broad range of PhD programmes at DTU,. A common academic goal (learning outcome) for all graduates of an MSc programme is to process knowledge about sustainability, innovation and entrepreneurship. In addition, DTU offers specific MSc programmes within wind energy, sustainable energy and environmental engineering.

Since 2015 DTU host the Nordic centre of the Climate KIC (European Institute of Innovation and Technology). The Climate KIC is Europe's largest public-private innovation partnership focused on climate change, consisting of dynamic companies, the best academic institutions and public sector. Within the framework of Climat KIC, DTU offers 8 Climate KIC master programmes

In an effort to ensure continuous developments and improvements in the area of sustainability a number of other extra curricular activities and initiatives are established at DTU Campus to the benefit of students, including:

- Roadrunners – Students build energy effective vehicles and propulsion systems and compete on a yearly basis in Shell Eco Marathon (http://www.ecocar.mek.dtu.dk/)
- Solar decathlon – Students create an innovative plus-energy house project and participate in an international competition Solar Decathlon Europe (http://www.byg.dtu.dk/Innovation_og_myndighedsbetjening/Danish_Building_Academy/Solar-Decathlon)
- Bryghus (Brew house) - Students co-operate on developing and optimising a sustainable beer brewery. (http://www.bryghus.dtu.dk/)

Since 2010, DTU has once a year organized GRØN DYST (Green Challenge); a student conference where students present their green projects developed as an integrated part of the educational activities.

Green Challenge is an educational initiative at DTU. The aim is to ensure that future engineers integrate aspects of sustainability, climate technology, and the environment in their work.

Every year more than 300 students from DTU and its international partner universities compete on a display of climate friendly technologies.

In addition to the students' actual green projects Green Challenge gives the students additional practical experience in areas such as communications and networking. This happens in relation to areas such as participation in conferences, preparation of abstracts, project presentations to people who do not necessarily have an engineering background and face to face meeting with other students and people from judge panels. Moreover, many projects contain elements of innovation.

DTU is the co-founder of a number of strategic international university alliances where the partners collaborate on projects within research, innovation, and education: all characterised by a strong focus on green technology and sustainable energy.

Nordic Five Tech

The Nordic Five Tech university alliance brings together the five leading technical universities in the Nordic countries; Aalto University, Chalmers University of Technology, , KTH Royal Institute of Technology, Norwegian University of Science and Technology and DTU, with very strong competences within sustainable energy and environmental engineering *(www.nordicfivetech.org).* The alliance has developed special programmes and services for its more than 80,000 engineering students; among these five joint master programmes that are supported by the Nordic Council of Ministers, Programmes of particular relevance to climate change are:

- Nordic Master in Innovative Sustainable Energy Engineering
- Nordic Master in Environmental Engineering

EuroTech Universities

The EuroTech Universities *(www.eurotech-universities.eu)* is a strategic partnership of leading universities of science and technology committed to excellence in research and jointly developing solutions to the grand challenges of society. The members are: Technical University of Denmark (DTU), École Polytechnique Fédérale de Lausanne (EPFL), Eindhoven University of Technology (TU/e) and Technical University of Munich (TUM).

In 2012, the alliance launched the Green Tech initiative which resulted in three joint research projects within Energy Efficient Buildings and Communities, Interface Science Photovoltaics and Wind. The initiative ran from 2012-2016. The cornerstones in the projects were co-supervision of co-financed PhDs and Postdocs, supervision of MSc projects, summer and winter schools, presentations at international conferences and joint publications.

Within EuroTech, DTU offers a number of 1:1 MSc programmes, where students study one year at DTU and one year at the partner university. Of these, two are of particular relevance to climate change: the DTU-TUM and the DTU-EPFL 1:1 MSc programmes in Environmental Engineering.

KAIST (Korean Advanced Institute of Science and Technology)

DTU and KAIST have collaborated since 2008. The alliance has links to the Green Growth Alliance between the governments of Denmark and Korea and is based on a strong synergy in research, education and innovation as well as a shared focus on green growth and the development of sustainable solutions to grand societal challenges.

One of the cornerstones of the DTU-KAIST alliance is the 11 Dual Degree Master's Programmes where students obtain a double degree by studying one year at DTU and one year at KAIST. One of the programmes is of particular interest to climate change: The Offshore Wind Energy Dual Degree Programme.

In 2011, DTU and KAIST established a joint virtual "Green Technology Research Center". This initiative features six different research themes that are implemented through joint workshops, PhD projects, participation in expositions and faculty exchange:

- Battery research and development
- Biorefinery
- Biosustainablity

- Fuel cells
- Integrated water technology
- Offshore wind turbine systems

EERA, European Energy Research Alliance
In this framework, fifteen leading European Research Institutes have taken up the challenge to found a European Energy Research Alliance (EERA). The key objective of the EERA is to accelerate the development of new energy technologies by conceiving and implementing Joint Research Programmes in support of the SET-Plan pool and integrate activities and resources, combining national and Community sources of funding and maximising complementarities and synergies

SEEIT, Sustainable Energy Education, Innovation and Technology
SEEIT is a European strategic partnership for sustainable energy education, innovation and technology, driven by the need and potential of a sustainable, low-carbon economy and inspired by the SET Plan in the formulation of its objectives and goals (Strategic Energy Technology Plan).

The members of the partnership are Aalto University, Copenhagen Business School, DTU, TU Delft, NTNU, ISE Fraunhofer, TU München, ALU Freiburg, SINTEF, Politecnico di Torino and ENEA.

The mission of the partnership is to develop new and integrated approaches to Innovation and Education in sustainable energy.

The partnership organises research workshops within areas of sustainable energy such as wind energy, photovoltaics and solar energy, and since 2012 the partnership has offered an Erasmus Mundus Wind Energy Masters, co-ordinated by TU Delft in collaboration with Oldenburg, NTNU, and DTU.

SEEIT also collaborates on e-learning (”Virtual Campus Hub” - FP7 Infrastructures) and contributes to EC level Expert Groups to develop the European Energy Education and Training initiative (SET Plan initiative).

ECRA, European Climate Research Alliance
DTU is co-founder, national contact point and a member of the Executive Committee of the European Climate Research Alliance (ECRA) which brings together leading research institutions in Europe with the aim to strengthen, expand and optimise EU climate research capabilities through the sharing of world-class national facilities in Europe and the collaborative realisation of pan-EU programmes. A main premise of ECRA is that national and European Climate change research programmes have to be streamlined and coordinated, in order to ensure optimum use of human resources, modelling capacities, field activities, and infrastructures, maximising the impact of scientific results and reinforcing the European Research Area for climate change science. DTU also chairs the ECRA collaborative programme on “high impact events and climate change”.

DTU has developed a number of e-learning courses in recent years bringing the advantages of this platform to truly global distribution of participants. Two are highlighted. The Wind Energy Coursera course (https://www.coursera.org/learn/wind-energy) made by DTU now boasts 19508 active learners, and 1993 course completers, and has been rated 4.6 out of 5 from 783 ratings. The Wind Energy Master programme (http://www.wem.dtu.dk/), accredited by the Danish Accreditation Institution (http://en.akkr.dk), is aimed at engineering professionals looking at expanding their academic profile and transferring to a profession in renewables.

9.1.6 Roskilde University

Bachelor studies in natural and social sciences, humanities and technologies at Roskilde University contain climate-related components. Climate science, climate policy modules, energy production and the social dynamics behind such issues are included in the master studies in technological and socioeconomic planning (Teksam), Geography and in the university's new two-year multi-disciplinary, international master's programme in Environmental Risk. Optional courses in the fields of environment and energy with climate-related contents are available to students of these subjects.

Climate-change impacts are also important in relation to the natural science PhD programme, which focuses on how natural stresses (e.g., drought, temperature extremes, diseases) and stress deriving from human activities (e.g., toxic chemicals, habitat destruction) impacting ecological systems.

9.1.7 Danish Meteorological Institute (DMI)

DMI presents general information material on www.dmi.dk, offering both current news, basic knowledge on climate and climate-change issues and in-depth topic themes which are widely used in Danish schools.

DMI assists schoolbook publishers with fact-check proofreading, graphics and other consultancy.

DMI also welcomes students from the 9th and 10th grades at state schools in Denmark to participate in a short-term work experience. The programme has a duration of one week and takes place three times a year. Among other things the students learn about climate by using an interactive climate model which is a simplefied version of real climate models.

DMI participates in the education, supervision and training of PhD students, master studenst and bachelor students in collaboration with Danish universities in areas of climate change and related issues.

9.1.8 Ministry of Education

During the UN Decade on Education for Sustainable Development (DESD) the Ministry of Education took a series of initiatives for primary and lower secondary education, youth education programmes and tertiary education in order to put climate on the agenda. With a series of initiatives for primary and lower secondary education, youth education programmes and relevant tertiary education from 2008 to 2010, the Danish Ministry of Education undertook a special effort to encourage pupils/students, teachers and schools to put climate change on the agenda.

The initiatives were based on five key perspectives, which have been dealt with differently depending on educational programmes, the proficiency of students and teaching context:

- Knowledge perspective - what do we know about Earth's climate and factors that affect it?
- Action and behavioural perspective - what can be done to limit global warming?
- Technology and community perspective - which technologies / production forms in existence could help limit the greenhouse effect? What are the socio-economic conditions for the spread of these technologies / production forms?
- Future Perspective – future sustainable technologies, practices and dissemination
- Socio-economic perspective - issues connected to climate change, including
    a) How will climate change and efforts to improve the climate influence economic growth?
    b) Security aspects of climate and energy policy

On the EMU - Denmark's educational website portal – information and links aimed at primary and secondary school, vocational training and education and the general upper secondary programmes are provided (see http://www.emu.dk/).

A number of websites, developed during the DESD, are still relevant but no longer updated. They provide references, links, articles, literature suggestions, teaching examples as well as examples of how it is possible to create different types of sustainable development. This goes for UBU-Portalen www.ubuportalen.dk.

9.2 Climate information

9.2.1 Ministry of Energy, Utilities and Climate

The websites of the Ministry of Energy, Utilities and Climate (www.efkm.dk) and of the Danish Energy Agency (www.ens.dk) are updated regularly with the latest relevant information within the climate area, either directly in the form of press releases, documents, reports, etc. or through links to relevant professionals.

In accordance with the political Energy Agreement from March 2012, a special effort to develop strategic energy planning and CO_2 calculation tools for Danish municipalities has been initiated by the Danish Energy Agency. The purpose of municipal strategic energy planning (SEP) is to promote a shift towards a more flexible energy system to realize the potential for energy savings and conversion to renewable energy in the most efficient way for society. It is up to the local authorities whether they will develop strategic energy plans. On the basis of previous work and new analyses carried out in 2012 and 2013, the toolbox made available for the municipalities now contains:

- Guidelines regarding mapping methods and data collections, and
- Guidelines regarding system change analyses and scenario analyses.

Furthermore, financial support from a dedicated pool, totalling DKK 19 million for the period 2013 to 2015, was made available for municipalities to apply for in order to promote partnerships for strategic energy planning.

9.2.2 Aarhus University (AU)

DCE – Danish Centre for Environment and Energy, Aarhus University prepares regular reports about environmental issues, including climate change. They are published at dce.au.dk.

In May 2015 AU hosted the 2nd European Climate Change Adaptation Conference (ECCA) in Copenhagen.

In 2015, DCE published a book – no. 3 in the series "The Environment Library" - on "Climate Change Adaptation – Why and How?"(in Danish) for use in the education sector and for the public in general. This book describes in a non-technical language what sectors could be affected by a changing climate, and what the options are for both hard and soft adaptation measures.

In 2016, Aarhus University published the" BASE adaptation inspiration book", describing 23 European cases of climate change adaptation for inspiration. The book was published under the AU lead EUFP7 'BASE-project'.

AU also publishes several journals for public outreach. These journals include articles on various subjects within natural science, but climate-related subjects have a dominant role and several volumes of the journals have been dedicated to climate. In addition researchers from AU publish findings of interest to the general public in various public outreach journals as well as on the internet (e.g. www.videnskab.dk).

DCA – the Danish Centre for Food and Agriculture at AU has prepared several reports on 1) greenhouse-gas emissions from agriculture and how these emissions can be reduced, and 2) impacts of climate change on Danish and European agriculture.

9.2.3 University of Copenhagen

Dissemination on climate from researchers at the Niels Bohr Institute (NBI) is available on the homepage http://www.isarkiv.dk/, established with support from the Ministry of Research and Education. In addition, KU hosts 50 high school classes every year for climate lessons and view of the Greenland ice cores. On the NBI home page under http://www.nbi.ku.dk/sciencexplorer/, movies on climate an ice core drilling are available and have been accessed by more than 1 million people. Researchers from NBI have been lead authors on AMAP's assessment of the Snow, Water, Ice and Permafrost in the Arctic (SWIPA, http://www.amap.no/swipa) and researchers at the faculty of Science have been contributing-, lead- or coordinating-lead-authors on the IPCC 5th assessment report cycle (AR5) for its working groups one and two.

9.2.4 Technical University of Denmark

The research by the Technical University of Denmark on current and future extreme precipitation and methods for analysis of adaptation measures has been communicated extensively both nationally and internationally and been adopted for use in urban water infrastructure management in a range of countries since 2008. The principal means of national communication is via a portal maintained by the Danish Society of Engineers (ida.dk/svk).

DTU has developed and executed continuous learning courses to ensure rapid uptake of the developed frameworks and paradigms and university researchers are often invited for interviews on national media.

DTU is involved in the development and application of training courses with Climate-KIC on cost benefit analysis and climate change adaptation. Similar training and ongoing learning are integrated elements in ongoing research projects on climate change damages in partnerships with local governments and the private sector.

The UNEP DTU Partnership (UDP) manages a number of information platforms covering e.g. CDM projects and Nationally Appropriate Mitigation Actions (NAMAs) worldwide, tracking mitigation actions by non-state actors on the Climate Initiatives Platform etc.

9.2.5 DMI

DMI disseminates knowledge on climate issues to the general public from an extensive website at www.dmi.dk, offering both current news, basic knowledge on climate and climate-change issues and in-depth topic themes. DMI also communicates through, series of reports and popular articles in newspapers and trade journals.

Members of DMI staff give lectures to high-school and university students, teachers, researchers and others. For instance, since 1998 staff members have been taking part in annual national events such as the two annual Science Festivals, *Forskningens Døgn* og *Naturvidenskabsfestival*, giving lectures around Denmark. 150,000 students take part in the events and activities of *Naturvidenskabsfestival* each year, and 75,000 guests from a broad audience visit the science festival of *Forskningens Døgn*. In 2016, 39% of primary schools and 63% of high-schools participated in *Naturvidenskabsfestival*.

On the annual Culture Night in Copenhagen, DMI participates with outreach activities for the general public on climate change and related issues. Finally, employees at DMI often take part in radio and TV interviews, and in interviews for the printed press.

DMI in collaboration with GEUS and DTU display the results of their monitoring of the Greenland Ice Sheet and the sea ice in the Arctic on the webportal polarportal.dk. The main purpose of the site is to make updated information from this monitoring available to the general public, both nationally and internationally. In addition, the site will provide access to scientifically based information resources.

9.2.6 GEUS

GEUS participates in a number of international research projects, foras and network groups and contributes to the supervision of Master and Ph.D students. In 2016 GEUS launched an open Geothermal Energy portal[1] providing essential data regarding the geothermal potential in Denmark.

The PROMICE monitoring is part of the AMAP, Arctic Monitoring and Assessment Programme. In collaboration with DMI and DTU Space, a new Arctic monitoring web-site "Polar Portal" was launched in June 2013[2] . On this web-site the Danish Arctic research institutions present updated knowledge on the condition of two major components of the Arctic: The Greenland ice sheet and the sea ice. GEUS is furthermore involved in work at the following groups or organisations:

- International Arctic Science Committee-Working Group on Arctic Glaciers (IASC),
- World Glacier Monitoring Service (WGMS),
- GlobGlacier user group (ESA),
- Global Land Ice Measurements from Space (GLIMS),
- Colorado University/CIRES station network,
- GC-Net and
- WMO.

In relation to CO_2 storage GEUS participate the following networks:

- CGS Europe,
- CO2GeoNet Association,
- EERA (European Energy Research Alliance) and
- ENeRG (European Network for Research in Geo-Energy).

9.2.7 University of Greenland

Ilimmarfik Institute at Ilisimatusarfik, University of Greenland, covers social sciences and humanities. The Ilimmarfik Institute is involved in a series of activities which include focus on climate change and specific courses with focus on climate change are offered at BA and MA levels.

The Climate and Society programme

The Climate and Society programme connects Ilisimatusarfik, University of Greenland, and the Greenland Climate Research Centre (GCRC) and focuses on issues of pressing current concern for society and the environment in Greenland. The Climate and Society programme carries out research and contributes to teaching at the intersection of social science, climate science and public policy.

The Climate and Society programme complements research in the natural sciences at GCRC and the work aims to improve understanding of the interconnections between climate change, the use of natural resources, non-renewable resource development, and social-ecological systems in Greenland.

Education and communication are central activities. The Climate and Society programme is a foundation for formal educational links between GCRC and Ilisimatusarfik and the Climate and Society programme is contributing to teaching of undergraduate students and supervision of graduate students at Ilisimatusarfik at both Master's and PhD level.

The Climate and Society programme employs a professor, researchers and PhD students, and the five current main projects under the Climate and Society programme are:

- Inuit Pinngortitarlu—Nuuk Fjord Monitoring and Mapping Project.
- Climate Change and Extractive Industries.
- Kalaalimernit: Greenlandic Foods, Cultural Identity and Climate Change.
- Greenlandic Communities and Living Resources.
- Climate Change, Policy and Governance.
-

Major Projects

Researchers at the institute are involved in the following major projects:

- HACHTAGG (Handling Arctic climate CHange - Towards A Greener Growth) is a new international project on climate change and green growth.
- SWIPA (Snow, Water, Ice, Permafrost in the Arctic) is an international and multidisciplinary Danish lead project within the frame of Arctic Council's AMAP (Arctic Monitoring and Assessment Programme).
- SLiCA (Survey of Living Conditions in the Arctic) was an international project which looked into the living conditions for Inuit and Sami including the effects of climate change.

9.2.8 Greenland Institute of Natural Resources (GINR)

GINR advises the Government of Greenland and other authorities on sustainable exploitation of living resources and safeguarding the environment and biodiversity.

GINR is managed by a Board of Governors and a Director under the Ministry of Infrastructure, Climate and the Environment in the Government of Greenland and according to Act of Greenlandic Parliament no. 6 of 8 of June 1994 on the Greenland Institute of Natural Resources GINR is obliged to:

- provide the scientific basis for an assessment of sustainable use of the living resources in and around Greenland as well as a scientific basis for protecting the environment and securing biological diversity
- advise the Greenland Government on the work of the Institute
- publish results of its research.

Results on climate issues gathered through the ongoing research and monitoring efforts are also communicated in local and international forums.

GINR are actively participating in expert networks of the Circumpolar Biodiversity Monitoring Program (CBMP), which has been endorsed by the Arctic Council and the UN Convention on Biological Diversity.

GINR also manages the marine monitoring efforts and takes part in the terrestrial/limnic monitoring efforts of the Greenland Ecosystem Monitoring (GEM). GEM is active in national and international climate forums, representing a key Danish-Greenland collaboration on Arctic climate change.

9.3 DANISH PARTICIPATION IN INTERNATIONAL CLIMATE ACTIVITIES

9.3.1 DMI

DMI contributes to international climate assessments, notably the IPCC Assessment Reports and assessments by the Arctic Monitoring and Assessment Programme of the Arctic Council, such as the Adaptation Actions for a Changing Climate science report for the Baffin Bay/Davis Strait.

DMI is engaged in communicating the IPCC's reports to the public through dissemination on the DMI website, and DMI has translated the Summary for Policymakers of the IPCC WGI AR5 report into Danish. .

9.3.2 Aarhus University (AU)

Aarhus University participates at expert level as authors in the IPCC and other climate assesments (e.g. the SWIPA report) .

DCA – Danish Centre for Food and Agriculture has contributed with a lead author to recent IPCC assessment reports.

Researchers at AU are actively involved with leading roles in European and international research on quantification of greenhouse gas emissions, quantification of mitigation measures, impacts research as well as evaluating measures and strategies for adaptation to climate change. The results feed into the IPCC emissions inventory guidelines and the IPCC assessment reports.

AU also takes part in numerous international networks and research projects on understanding the climate system, causes for climate change, consequences for the ice sheet and ocean circulation as well as impact on ecosystems and biodiversity.

AU participates as national experts in Joint Programming Initiative (JPI) Climate. AU is represented in the Scientific Advisory Board and in the Governing Board of Joint Programming Initiative on Agriculture Food Security and Climate Change (FACCEJPI).Initiatvie (JPI) Climate.

DCE – Danish Centre for Environment and Energy is a member of 'Partnership for European Environmental Research – PEER'. Through PEER, AU has initiated and participated in several international activities coordinating, developing and dissemination climate change related research.

Researchers under the umbrella of DCA is participating in 1) the UN Task Force on Emissions, Inventories and Projections (TFEIP) Agriculture and Nature Expert Panel, 2) the UN Task Force on Reactive Nitrogen, 3) the annual forum of the Global Alliance on Climate Smart Agriculture, and its working groups on Knowledge Action Group, Enabling Environment Action Group and Investment Action Group, and 4) working groups under the Global Research Alliance on Agricultural Greenhouse Gases.

AU is a member of the European Topic Centre on Climate Change impacts, vulnerability and Adaptation (ETC/CCA) under European Environmental Agency focus on Climate-ADAPT.

9.3.3 Technical University of Denmark (DTU)

DTU has participated extensively in the work of the Intergovernmental Panel on Climate Change (IPCC), as CLA and LA for more than 20 years. DTU contributed to the AR5 working group 3 and is further engaged in scoping and review activities for the IPCC special reports, and has been part of the scoping process for the upcoming AR6. It is expected that DTU experts will be involved in the AR6 starting in 2018.

UNEP DTU Partnership (UDP) manages the annual science-based assessments of the Emissions Gap and the Adaptation Gap undertaken by the UN Environment. In 2017 this work involves more than 44 scientific groups in over 20 countries, and includes contributions by UDP staff. The Emissions Gap Report gives an annual, authoritative assessment of the gap between the aggregate effect of national mitigation pledges and the global ambition needed to limit temperature increase to well below 2 degrees or 1.5 degrees Celsius: the emissions gap. The Adaptation Gap Report assesses differences between actual levels of adaptation action in key areas and the levels required to achieve certain goals. Following the adoption of a global goal on adaptation in the Paris Agreement, the Adaptation Gap Report focuses on ways forward to make the global goal operational and track progress towards it. The annual gap reports are a crucial reminder about the ambition necessary to mitigate catastrophic levels of climate change and to adapt to projected risks and impacts. The media, NGOs, negotiators and national policy makers alike use the assessments to push for higher levels of ambition both in reducing emissions and in funding adaptation measures.

DTU has a long track record of participation in international research projects with support primarily from the European Commission's framework research programmes. Under the current Horizon 2020 framework programme, DTU participates in a number of projects related to climate change mitigation and adaptation as well as climate service development, e.g. aiming at supporting European and global development towards a low-carbon and climate resilient society.

9.3.4 University of Copenhagen

The University of Copenhagen is involved in a number of projects in relation to climate change in the tropical regions, focusing on research and outreach.

KU researchers have also played an important role in the work of the IPCC. This includes work under the Department for Plant and Environmental Sciences (PLEN) in the Faculty of Science as coordinating lead author for the IPCC 5th assessment for the chapter in WG2 on food security and food production systems. Emeritus professor John R Porter has recently been selected by the IPCC as the sole Danish researcher for the forthcoming IPCC Special Report on climate change and land use.

PLEN also works with impact models of agricultural crops including extreme events, methods to estimate GHG emissions and combined food and energy producing systems in agriculture. Soil-water-plant-atmosphere process understanding covering microclimate, energy and gas exchange between canopy and atmosphere is applied in the development of models (The DAISY model). PLEN has also play an active role in the Joint Programming Initiative (JPI) in Food Security, Agriculture and Climate (FACCE) of the EU which focus is to examine the food systems and food security of large capital cities and PLEN has close collaboration with the UN research facility; CCAFS.

Researchers from the Niels Bohr Institute (NBI) chair the climate section of the European Geophysic Union and are members of the climate board CLiC (Climate and Cryosphere; http://www.climate-cryosphere.org/). A number of research projects at NBI are contributing to a better understanding of cryospheric processes of importance for a changing climate. As an example, the European Reseach Council (ERC) synergy grant funded project ice2ice focus on the role of sea ice as an important mediator of climate changein the Arctic driven by the ocean. One researcher from NBI currently serves as a member of the Joint Scientific Committee (JSC) for WMO’s World Climate Research Programme (WCRP).

9.3.5 Greenland Institute of Natural Resources (GINR)

GINR is part of numerous international networks and research projects in the Arctic on the effects of climate and climate change on both terrestrial and marine ecosystems.

The GINR research spans from oceanography and biogeochemistry to macroecology, and also includes the aspect of social impacts. Through cross-disciplinary and cross-institutional efforts, GINR aims to improve the understanding of the links between climatic and ecological processes in the Arctic, and the impact of climate change on the human population in Greenland, who rely very much on the natural resources.

9.4 PUBLIC CAMPAIGNS

A number of initiatives are being carried out to promote environmentally sound behaviour in companies and households, particularly for climate reasons, and with respect to energy use. Labelling schemes, printed matter, information lines, media spots and similar are used to increase public knowledge of possibilities for action and knowledge about less environmentally harmful technologies.

In October 2015, a campaign “New Energy” on the green transition by 2050 was launched by the Danish Energy Agency (http://nyenergi.nu/#anc-derfor-er-du-en-del-af-nyenergi).

[1] http://dybgeotermi.geus.dk/geotherm/
[2] http://polarportal.dk/en/home/

ANNEXES

Annex A Greenhouse gas inventory and National Registry information

This annex contains the following information:

Annex A1: Greenhouse gas inventories 1990-2015.
Greenhouse gas inventory information in the form of Common Reporting Format (CRF) summary tables from the May 2017 inventory submission under the UNFCCC and the KP.

Annex A2: Danish National Allocation tables for installations and aviation in accordance with phase 3 of the EU ETS (2013-2020).

Annex A3: Information on Denmark's KP Registry.

a. Information on the registry administrator
b. Cooperation with other countries concerning operation of the registry
c. Database structure and capacity
d. Standards for data exchange
e. Procedures for administration and operation of the KP registry
f. Safety standards
g. Information available to the public
h. Internet address for the registry
i. Protection, maintenance and recreation of data
j. Test procedures

Annex A4: Publicly available registry information - 2017 KP Reports.

1. Public Information on Account Information
2. Public Information on Legal Entities

Annex A1 Greenhouse gas inventories 1990-2015

This Annex contains nine tables summarising the results of the latest greenhouse gas inventories for Denmark, Greenland and the Faroe Islands 1990-2015. The tables are based on the annual report under the Climate Convention and the Kyoto Protocol from May 2017 (Nielsen et al., 2017, including the CRF).

TABLE A1.1 (CRF TABLE 10S1): DENMARK'S EMISSIONS AND REMOVALS OF CARBON DIOXIDE (CO_2) IN THE PERIOD 1990-2015

TABLE A1.2 (CRF TABLE 10S2): DENMARK'S EMISSIONS OF METHANE (CH_4) IN THE PERIOD 1990-2015

TABLE A1.3 (CRF TABLE 10S3): DENMARK'S EMISSIONS OF NITROUS OXIDE (N_2O) IN THE PERIOD 1990-2015

TABLE A1.4 (CRF TABLE 10S4): DENMARK'S EMISSIONS OF INDUSTRIAL GREENHOUSE GASES (HCFS, PFCS, SF_6 AND NF_3) IN THE PERIOD 1990-2015

TABLE A1.5 (CRF TABLE 10S5): DENMARK'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

TABLE A1.6 (CRF TABLE 10S5): GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

TABLE A1.7 (CRF TABLE 10S5): FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

TABLE A1.8 (CRF TABLE 10S5): DENMARK'S AND GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

TABLE A1.9 (CRF TABLE 10S5): DENMARK'S, GREENLAND'S AND FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

Note references in the tables:

(1) The column "Base year" is filled with estimates for the base year under the Climate Convention which is 1990. This base year is used to calculate the percentage change in the final column of this table. Denmark's and Greenland's base year under the Kyoto Protocol was fixed in 2007 on the basis of the annual inventories reported in 2006 (see Chapter 3.5) and deviates from the base year under the Convention.

(2) Net emissions/removals as reported in table Summary 1.A. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(3) In accordance with the UNFCCC reporting guidelines, for Parties that decide to report indirect CO2 the national totals shall be provided with and without indirect CO2.

(4) In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is kt of CO2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

(5) Includes net CO_2, CH_4 and N_2O from LULUCF.

The notation keys are as follows:

"NO" : Not Occurring,
"NE" : Not Estimated,
"NA" : Not Applicable,
"IE" : Included Elsewhere

TABLE A1.1 (CRF TABLE 10S2.1): DENMARK'S EMISSIONS AND REMOVALS OF CARBON DIOXIDE (CO_2) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(kt)										
1. Energy	51676.89	51676.89	62209.89	56377.99	58665.13	62624.99	59415.95	72668.23	63137.60	59073.68	56500.91
A. Fuel combustion (sectoral approach)	51336.19	51336.19	61560.43	55701.25	58083.19	62047.18	58962.50	72170.63	62440.25	58551.00	55394.76
1. Energy industries	26149.78	26149.78	35019.97	30092.91	31668.06	35667.08	32160.16	44468.04	35337.67	31681.53	28590.83
2. Manufacturing industries and construction	5394.16	5394.16	5925.63	5781.37	5638.78	5729.59	5838.64	5981.36	6021.82	6039.23	6127.00
3. Transport	10576.36	10576.36	10992.06	11193.14	11300.47	11778.39	11917.86	12174.15	12347.07	12301.93	12323.08
4. Other sectors	9048.95	9048.95	9284.85	8438.34	9180.43	8558.04	8728.02	9301.28	8488.88	8246.20	8089.20
5. Other	166.94	166.94	337.92	195.50	295.44	314.08	317.81	245.80	244.80	282.11	264.65
B. Fugitive emissions from fuels	340.70	340.70	649.46	676.73	581.94	577.81	453.46	497.60	697.34	522.68	1106.15
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and natural gas and other emissions from energy production	340.70	340.70	649.46	676.73	581.94	577.81	453.46	497.60	697.34	522.68	1106.15
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial processes	1277.96	1277.96	1470.11	1601.35	1608.32	1646.42	1641.99	1756.83	1815.59	1862.16	1843.59
A. Mineral industry	1081.50	1081.50	1258.38	1380.57	1398.48	1418.76	1418.15	1525.50	1598.77	1632.39	1608.72
B. Chemical industry	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.78	0.86	0.72	0.84
C. Metal industry	30.47	30.47	30.47	30.47	36.15	33.67	38.75	35.38	35.16	42.50	43.19
D. Non-energy products from fuels and solvent use	165.08	165.08	180.34	189.37	172.76	193.05	184.10	195.06	180.71	186.39	190.54
E. Electronic industry											
F. Product uses as ODS substitutes											
G. Other product manufacture and use	0.06	0.06	0.07	0.08	0.07	0.08	0.13	0.12	0.09	0.15	0.29
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	618.57	618.57	511.63	403.46	349.96	412.20	537.07	417.78	483.22	263.92	273.77
A. Enteric fermentation											
B. Manure management											
C. Rice cultivation											
D. Agricultural soils											
E. Prescribed burning of savannas											
F. Field burning of agricultural residues											
G. Liming	565.49	565.49	462.54	357.39	306.79	367.07	495.98	393.03	469.58	252.24	264.99
H. Urea application	14.67	14.67	11.73	12.61	13.49	18.19	15.18	8.65	4.03	4.25	2.93
I. Other carbon-containing fertilizers	38.41	38.41	37.36	33.46	29.68	26.95	25.92	16.10	9.60	7.44	5.84
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land use, land-use change and forestry [2]	4855.82	4855.82	4214.61	4946.17	4199.90	3903.48	4135.93	3340.65	3827.89	4007.60	4067.56
A. Forest land	-584.74	-584.74	-586.32	-588.01	-589.81	-591.72	-593.73	-595.85	-598.07	-600.40	-602.84
B. Cropland	4411.61	4411.61	3659.02	4577.26	4058.98	3670.36	3912.34	3089.84	3443.23	3540.75	3510.64
C. Grassland	917.93	917.93	912.74	901.33	900.67	884.57	843.56	876.04	881.47	852.22	822.00
D. Wetlands	100.59	100.59	92.25	91.84	79.34	75.60	71.43	85.82	107.08	87.50	70.20
E. Settlements	12.82	12.82	13.93	15.04	16.15	17.27	18.38	19.49	20.61	21.72	22.83
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested wood products	-2.38	-2.38	123.00	-51.28	-265.43	-152.60	-116.05	-134.69	-26.42	105.81	244.73
H. Other											
5. Waste	17.54	17.54	17.94	18.99	17.66	17.75	19.60	19.86	18.85	17.65	18.52
A. Solid waste disposal	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
B. Biological treatment of solid waste											
C. Incineration and open burning of waste	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Waste water treatment and discharge											
E. Other	17.54	17.54	17.94	18.99	17.66	17.75	19.60	19.86	18.85	17.65	18.52
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items:											
International bunkers	4743.08	4743.08	4272.97	4451.61	5846.96	6539.40	6810.31	6657.87	6309.56	6480.36	6319.39
Aviation	1730.74	1730.74	1591.28	1646.69	1620.85	1779.77	1822.91	1916.56	1968.70	2129.55	2255.68
Navigation	3012.34	3012.34	2681.69	2804.92	4226.11	4759.63	4987.40	4741.31	4340.87	4350.81	4063.71
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO_2 emissions from biomass	4571.65	4571.65	4962.05	5208.30	5430.16	5376.38	5638.60	6020.62	6232.59	6183.26	6514.84
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Indirect N_2O											
Indirect CO_2 [3]	1216.97	1216.97	1259.31	1228.41	1205.60	1161.78	1137.55	1123.95	1048.27	1004.12	937.75
Total CO_2 equivalent emissions without land use, land-use change and forestry	53590.96	53590.96	64209.57	58401.78	60641.06	64701.36	61614.61	74862.71	65455.25	61217.42	58636.78
Total CO_2 equivalent emissions with land use, land-use change and forestry	58446.78	58446.78	68424.18	63347.96	64840.96	68604.84	65750.54	78203.36	69283.14	65225.02	62704.34
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	54807.93	54807.93	65468.88	59630.19	61846.66	65863.14	62752.16	75986.65	66503.52	62221.54	59574.54
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	59663.75	59663.75	69683.49	64576.37	66046.55	69766.62	66888.10	79327.31	70331.41	66229.14	63642.09

TABLE A1.1 (CRF TABLE 10S2.2): DENMARK'S EMISSIONS AND REMOVALS OF CARBON DIOXIDE (CO_2) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	kt									
1. Energy	52148.98	53795.44	53419.32	58648.05	53073.20	49487.04	57401.38	52618.64	49438.56	47545.88
A. Fuel combustion (sectoral approach)	51426.08	53025.08	52745.63	57978.64	52321.41	48939.43	56870.52	52075.42	49051.48	47284.48
1. Energy industries	25566.14	26855.30	27075.38	31819.10	25936.56	22734.90	30649.94	26023.03	23909.55	23860.41
2. Manufacturing industries and construction	5921.77	6026.58	5734.47	5701.54	5763.01	5458.24	5582.09	5299.42	4802.46	3991.55
3. Transport	12123.72	12116.45	12212.55	12664.89	12986.90	13101.97	13468.41	14077.69	13774.70	13053.18
4. Other sectors	7617.47	7839.12	7539.44	7601.73	7292.26	7270.64	6941.61	6399.18	6356.62	6119.43
5. Other	196.97	187.62	183.79	191.37	342.68	373.67	228.47	276.10	208.15	259.92
B. Fugitive emissions from fuels	722.90	770.36	673.69	669.41	751.79	547.61	530.86	543.23	387.08	261.40
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and natural gas and other emissions from energy production	722.90	770.36	673.69	669.41	751.79	547.61	530.86	543.23	387.08	261.40
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial processes	1860.36	1849.23	1867.95	1729.21	1849.10	1794.67	1811.43	1811.97	1512.95	1060.80
A. Mineral industry	1628.90	1626.41	1667.32	1539.41	1656.99	1563.27	1615.40	1613.95	1331.87	886.03
B. Chemical industry	0.88	0.96	0.99	0.84	1.19	1.12	1.09	1.15	1.43	1.07
C. Metal industry	40.88	47.20	0.13	0.06	0.15	16.36	0.15	0.18	0.17	0.21
D. Non-energy products from fuels and solvent use	189.48	174.50	199.30	188.64	190.40	213.76	194.60	196.50	179.29	173.26
E. Electronic industry										
F. Product uses as ODS substitutes										
G. Other product manufacture and use	0.21	0.17	0.20	0.26	0.37	0.16	0.18	0.19	0.19	0.23
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	268.35	206.74	236.58	228.65	159.70	221.79	196.01	194.01	231.24	186.81
A. Enteric fermentation										
B. Manure management										
C. Rice cultivation										
D. Agricultural soils										
E. Prescribed burning of savannas										
F. Field burning of agricultural residues										
G. Liming	260.59	200.76	233.32	226.28	157.64	219.68	193.72	191.96	228.92	181.40
H. Urea application	2.35	1.69	0.73	0.81	0.59	0.44	0.95	0.81	0.22	1.83
I. Other carbon-containing fertilizers	5.41	4.29	2.53	1.56	1.47	1.67	1.34	1.24	2.10	3.58
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land use, land-use change and forestry [(2)]	4145.51	4901.07	5999.80	5611.49	5268.55	5169.46	5555.72	2826.92	-2009.68	2154.23
A. Forest land	-605.39	595.67	556.86	517.94	478.91	512.31	471.24	-2639.04	-6563.88	-1559.45
B. Cropland	3824.88	3254.09	4363.51	4088.90	3760.70	3540.05	3972.04	4420.94	3628.69	2758.94
C. Grassland	807.31	796.43	791.56	786.91	784.26	866.55	889.95	865.44	876.63	855.63
D. Wetlands	68.96	77.29	87.50	82.92	89.38	107.79	110.46	91.17	72.08	86.10
E. Settlements	23.94	25.03	26.11	27.19	28.27	44.79	46.98	49.27	51.76	54.03
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested wood products	25.81	152.56	174.27	107.63	127.04	97.96	65.05	39.15	-74.96	-41.04
H. Other										
5. Waste	18.40	18.30	17.95	19.34	17.60	18.13	18.70	19.29	21.42	21.02
A. Solid waste disposal	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
B. Biological treatment of solid waste										
C. Incineration and open burning of waste	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Waste water treatment and discharge										
E. Other	18.40	18.30	17.95	19.34	17.60	18.13	18.70	19.29	21.42	21.02
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items:										
International bunkers	6344.25	5675.94	4730.53	4974.45	4708.17	4893.06	5701.33	5924.84	5448.54	3793.70
Aviation	2312.31	2360.12	2031.55	2113.41	2403.38	2534.45	2554.94	2625.43	2631.80	2299.73
Navigation	4031.94	3315.82	2698.98	2861.04	2304.79	2358.61	3146.39	3299.41	2816.74	1493.97
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO_2 emissions from biomass	6836.69	7554.24	8039.03	9138.75	9875.62	10642.33	11026.96	12061.87	12292.81	12578.35
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Indirect N_2O										
Indirect CO_2 [(3)]	874.34	849.34	811.15	795.56	764.35	735.06	697.46	656.34	627.73	570.80
Total CO_2 equivalent emissions without land use, land-use change and forestry	54296.09	55869.71	55541.80	60625.25	55099.60	51521.63	59427.52	54643.91	51204.17	48814.51
Total CO_2 equivalent emissions with land use, land-use change and forestry	58441.60	60770.78	61541.60	66236.73	60368.15	56691.09	64983.24	57470.84	49194.49	50968.74
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	55170.43	56719.05	56352.94	61420.81	55863.95	52256.69	60124.98	55300.26	51831.90	49385.30
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	59315.94	61620.12	62352.75	67032.29	61132.51	57426.15	65680.70	58127.18	49822.23	51539.53

TABLE A1.1 (CRF TABLE 10S2.3): DENMARK'S EMISSIONS AND REMOVALS OF CARBON DIOXIDE (CO_2) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	kt						%
1. Energy	47988.26	42805.58	38263.62	40181.84	35980.44	33721.86	-34.74
A. Fuel combustion (sectoral approach)	47635.45	42553.77	38046.48	39938.06	35730.17	33474.78	-34.79
1. Energy industries	23692.59	19726.41	16526.29	18780.81	15300.29	12667.98	-51.56
2. Manufacturing industries and construction	4350.12	4271.12	3969.43	3866.05	3901.62	3830.36	-28.99
3. Transport	12992.37	12643.84	12012.43	11813.43	11989.20	12191.73	15.27
4. Other sectors	6393.93	5620.40	5323.93	5238.72	4308.86	4588.21	-49.30
5. Other	206.45	292.00	214.41	239.06	230.20	196.50	17.71
B. Fugitive emissions from fuels	352.81	251.81	217.14	243.78	250.27	247.09	-27.48
1. Solid fuels	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	352.81	251.81	217.14	243.78	250.27	247.09	-27.48
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	0.00
2. Industrial processes	1007.73	1180.67	1176.51	1188.22	1207.45	1225.94	-4.07
A. Mineral industry	803.84	992.67	994.22	995.55	1021.15	1051.79	-2.75
B. Chemical industry	1.12	1.15	1.35	1.38	1.48	1.56	82.82
C. Metal industry	0.18	0.24	0.13	0.16	0.18	0.18	-99.43
D. Non-energy products from fuels and solvent use	202.36	186.41	180.66	190.96	184.50	172.17	4.29
E. Electronic industry							
F. Product uses as ODS substitutes							
G. Other product manufacture and use	0.23	0.20	0.15	0.18	0.16	0.25	352.72
H. Other	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	156.19	165.05	192.04	246.46	240.24	177.45	-71.31
A. Enteric fermentation							
B. Manure management							
C. Rice cultivation							
D. Agricultural soils							
E. Prescribed burning of savannas							
F. Field burning of agricultural residues							
G. Liming	152.80	161.60	188.44	243.88	237.72	165.56	-70.72
H. Urea application	0.88	0.59	1.32	0.66	0.51	1.39	-90.50
I. Other carbon-containing fertilizers	2.51	2.86	2.28	1.93	2.01	10.49	-72.68
J. Other	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry (2)	-875.83	-2501.63	-337.96	989.18	56.95	4058.82	-16.41
A. Forest land	-3790.98	-5830.66	-4102.98	-2476.38	-4023.09	175.79	-130.06
B. Cropland	2007.96	2419.22	2545.10	2270.24	3002.59	2597.47	-41.12
C. Grassland	844.60	861.99	1129.14	1157.65	1129.08	1349.52	47.02
D. Wetlands	78.13	85.26	65.59	38.51	46.53	40.70	-59.54
E. Settlements	56.39	58.84	92.54	86.08	48.28	66.81	421.35
F. Other land	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products	-71.93	-96.28	-67.34	-86.92	-146.45	-171.46	7096.73
H. Other							
5. Waste	18.30	18.34	16.29	15.97	21.27	21.27	21.30
A. Solid waste disposal	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
B. Biological treatment of solid waste							
C. Incineration and open burning of waste	NO	NO	NO	NO	NO	NO	0.00
D. Waste water treatment and discharge							
E. Other	18.30	18.34	16.29	15.97	21.27	21.27	21.30
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	0.00
Memo items:							
International bunkers	4471.71	4575.38	4006.21	4356.49	4927.34	4937.77	4.10
Aviation	2400.84	2471.79	2493.47	2470.74	2680.72	2625.91	51.72
Navigation	2070.87	2103.59	1512.74	1885.75	2246.63	2311.85	-23.25
Multilateral operations	NE	NE	NE	NE	NE	NE	0.00
CO_2 emissions from biomass	14898.11	14538.55	14900.30	15006.21	14873.80	15690.68	243.22
CO_2 captured	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O							
Indirect CO_2 (3)	556.30	504.50	474.99	450.97	421.27	412.49	-66.11
Total CO_2 equivalent emissions without land use, land-use change and forestry	49170.48	44169.64	39648.46	41632.49	37449.41	35146.53	-34.42
Total CO_2 equivalent emissions with land use, land-use change and forestry	48294.65	41668.02	39310.50	42621.67	37506.36	39205.35	-32.92
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	49726.78	44674.14	40123.44	42083.46	37870.68	35559.02	-35.12
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	48850.95	42172.52	39785.49	43072.64	37927.63	39617.84	-33.60

TABLE A1.2 (CRF TABLE 10S3.1): DENMARK'S EMISSIONS OF METHANE (CH_4) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(kt)										
1. Energy	14.58	14.58	17.38	18.10	20.11	23.38	29.19	33.76	34.87	35.67	38.02
A. Fuel combustion (sectoral approach)	9.67	9.67	10.69	11.28	13.38	16.47	22.27	26.43	26.02	27.31	27.00
1. Energy industries	0.63	0.63	0.97	1.37	2.99	6.08	11.42	14.59	13.91	15.30	15.40
2. Manufacturing industries and construction	0.33	0.33	0.35	0.33	0.34	0.34	0.40	0.77	0.77	0.87	0.86
3. Transport	2.27	2.27	2.37	2.39	2.37	2.36	2.28	2.21	2.14	2.07	1.96
4. Other sectors	6.35	6.35	6.90	7.10	7.58	7.59	8.06	8.76	9.09	8.97	8.69
5. Other	0.08	0.08	0.10	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10
B. Fugitive emissions from fuels	4.90	4.90	6.69	6.82	6.73	6.92	6.92	7.33	8.85	8.36	11.01
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and natural gas and other emissions from energy production	4.90	4.90	6.69	6.82	6.73	6.92	6.92	7.33	8.85	8.36	11.01
C. CO_2 transport and storage											
2. Industrial processes	0.10	0.10	0.09	0.11	0.09	0.09	0.10	0.12	0.14	0.12	0.12
A. Mineral industry											
B. Chemical industry	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Non-energy products from fuels and solvent use	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
E. Electronic industry											
F. Product uses as ODS substitutes											
G. Other product manufacture and use	0.09	0.09	0.08	0.10	0.08	0.07	0.09	0.10	0.12	0.10	0.11
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	223.41	223.41	227.97	230.99	237.22	232.66	233.22	234.38	231.95	236.22	229.10
A. Enteric fermentation	161.58	161.58	162.81	160.75	162.97	159.12	158.70	158.62	153.16	153.30	147.39
B. Manure management	61.74	61.74	65.07	70.16	74.16	73.45	74.42	75.66	78.67	82.78	81.57
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field burning of agricultural residues	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.11	0.14	0.13
G. Liming											
H. Urea application											
I. Other carbon-containing fertilizers											
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land use, land-use change and forestry	0.76	0.76	0.80	0.87	0.94	1.00	1.07	1.14	1.21	1.28	1.34
A. Forest land	0.19	0.19	0.21	0.27	0.32	0.37	0.42	0.47	0.52	0.58	0.63
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C. Grassland	0.54	0.54	0.53	0.53	0.52	0.51	0.51	0.50	0.49	0.49	0.48
D. Wetlands	0.03	0.03	0.05	0.08	0.10	0.12	0.14	0.17	0.19	0.21	0.23
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested wood products											
H. Other											
5. Waste	66.89	66.89	67.12	66.49	66.06	62.97	59.54	58.34	55.25	52.42	53.41
A. Solid waste disposal	61.45	61.45	61.45	60.67	60.00	56.73	53.25	51.59	48.02	45.01	45.53
B. Biological treatment of solid waste	1.53	1.53	1.75	1.89	2.14	2.27	2.27	2.69	3.10	3.30	3.71
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	3.83	3.83	3.84	3.84	3.85	3.89	3.94	3.98	4.04	4.03	4.08
E. Other	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08	0.08
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total CH_4 emissions without CH_4 from LULUCF	304.97	304.97	312.56	315.70	323.49	319.09	322.06	326.60	322.20	324.43	320.65
Total CH_4 emissions with CH_4 from LULUCF	305.73	305.73	313.36	316.56	324.43	320.10	323.13	327.74	323.40	325.70	321.99
Memo items:											
International bunkers	0.07	0.07	0.07	0.07	0.10	0.12	0.12	0.12	0.11	0.11	0.10
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Navigation	0.06	0.06	0.06	0.06	0.09	0.10	0.11	0.10	0.10	0.10	0.09
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

TABLE A1.2 (CRF TABLE 10S3.2): DENMARK'S EMISSIONS OF METHANE (CH_4) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	kt									
1. Energy	36.27	37.39	36.35	35.73	36.35	34.06	32.35	30.24	29.01	25.56
A. Fuel combustion (sectoral approach)	26.40	27.21	26.67	26.27	26.08	24.45	23.06	21.50	21.13	19.09
1. Energy industries	14.69	15.57	15.14	14.40	14.08	12.44	11.53	9.60	10.12	8.84
2. Manufacturing industries and construction	1.07	1.13	1.03	1.00	1.01	0.89	0.74	0.52	0.57	0.52
3. Transport	1.83	1.72	1.62	1.54	1.44	1.33	1.22	1.12	0.95	0.81
4. Other sectors	8.71	8.70	8.79	9.24	9.46	9.71	9.51	10.20	9.45	8.89
5. Other	0.09	0.09	0.09	0.08	0.08	0.07	0.06	0.05	0.04	0.03
B. Fugitive emissions from fuels	9.87	10.18	9.68	9.46	10.27	9.61	9.29	8.74	7.88	6.47
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and natural gas and other emissions from energy production	9.87	10.18	9.68	9.46	10.27	9.61	9.29	8.74	7.88	6.47
C. CO_2 transport and storage										
2. Industrial processes	0.14	0.12	0.16	0.18	0.16	0.15	0.18	0.13	0.12	0.12
A. Mineral industry										
B. Chemical industry	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Non-energy products from fuels and solvent use	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02
E. Electronic industry										
F. Product uses as ODS substitutes										
G. Other product manufacture and use	0.12	0.10	0.14	0.16	0.14	0.13	0.16	0.11	0.10	0.10
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	228.75	235.48	236.13	235.73	233.53	227.30	222.97	225.93	223.45	222.20
A. Enteric fermentation	145.23	148.13	145.83	144.16	139.84	139.33	139.37	142.59	143.86	143.83
B. Manure management	83.40	87.22	90.19	91.43	93.54	87.82	83.45	83.21	79.47	78.23
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field burning of agricultural residues	0.13	0.13	0.11	0.13	0.14	0.14	0.14	0.13	0.12	0.14
G. Liming										
H. Urea application										
I. Other carbon-containing fertilizers										
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land use, land-use change and forestry	1.41	1.48	1.55	1.61	1.71	1.75	1.82	1.89	1.96	2.03
A. Forest land	0.68	0.73	0.78	0.83	0.91	0.94	0.99	1.04	1.09	1.14
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
C. Grassland	0.48	0.47	0.46	0.46	0.45	0.44	0.44	0.43	0.43	0.42
D. Wetlands	0.25	0.28	0.30	0.32	0.34	0.37	0.39	0.42	0.44	0.47
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested wood products										
H. Other										
5. Waste	51.13	52.84	50.31	51.55	46.16	45.35	47.53	46.10	44.60	43.51
A. Solid waste disposal	42.91	44.68	41.68	42.54	37.46	36.37	38.14	36.29	35.09	33.50
B. Biological treatment of solid waste	4.03	3.95	4.42	4.77	4.47	4.72	5.12	5.52	5.22	5.69
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	4.12	4.13	4.14	4.15	4.15	4.19	4.18	4.20	4.19	4.23
E. Other	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.09	0.09
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total CH_4 emissions without CH_4 from LULUCF	316.29	325.84	322.95	323.19	316.19	306.85	303.03	302.41	297.17	291.39
Total CH_4 emissions with CH_4 from LULUCF	317.70	327.31	324.49	324.80	317.90	308.60	304.85	304.30	299.14	293.42
Memo items:										
International bunkers	0.10	0.09	0.07	0.07	0.06	0.06	0.08	0.09	0.08	0.04
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Navigation	0.09	0.08	0.06	0.07	0.05	0.06	0.08	0.08	0.07	0.04
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

TABLE A1.2 (CRF TABLE 10S3.3): DENMARK'S EMISSIONS OF METHANE (CH_4) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	kt						%
1. Energy	27.66	23.46	19.03	17.44	14.99	14.60	0.17
A. Fuel combustion (sectoral approach)	21.36	18.19	14.40	13.14	10.69	10.54	9.02
1. Energy industries	11.01	9.22	6.39	5.62	4.02	3.41	441.92
2. Manufacturing industries and construction	0.59	0.54	0.39	0.34	0.40	0.52	56.23
3. Transport	0.73	0.65	0.57	0.51	0.47	0.44	-80.74
4. Other sectors	9.00	7.76	7.04	6.65	5.79	6.16	-3.02
5. Other	0.03	0.02	0.02	0.01	0.01	0.01	-87.86
B. Fugitive emissions from fuels	6.31	5.27	4.63	4.30	4.29	4.06	-17.28
1. Solid fuels	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	6.31	5.27	4.63	4.30	4.29	4.06	-17.28
C. CO_2 transport and storage							
2. Industrial processes	0.10	0.09	0.13	0.13	0.11	0.16	59.60
A. Mineral industry							
B. Chemical industry	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	0.02	0.02	0.02	0.02	0.02	0.02	58.93
E. Electronic industry							
F. Product uses as ODS substitutes							
G. Other product manufacture and use	0.08	0.07	0.11	0.12	0.09	0.14	59.70
H. Other	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	225.30	223.17	223.53	222.25	223.62	220.97	-1.09
A. Enteric fermentation	145.23	143.70	146.97	147.87	148.43	146.69	-9.22
B. Manure management	79.97	79.37	76.44	74.25	75.06	74.16	20.11
C. Rice cultivation	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	NE	NE	NE	NE	NE	NE	0.00
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	0.00
F. Field burning of agricultural residues	0.10	0.10	0.11	0.12	0.12	0.12	37.71
G. Liming							
H. Urea application							
I. Other carbon-containing fertilizers							
J. Other	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry	2.06	2.14	2.32	2.38	2.30	2.41	218.56
A. Forest land	1.15	1.15	1.15	1.15	1.15	1.17	524.31
B. Cropland	NO	0.06	0.15	0.17	0.07	0.19	100.00
C. Grassland	0.42	0.41	0.47	0.49	0.50	0.48	-10.96
D. Wetlands	0.49	0.52	0.55	0.56	0.58	0.58	1708.49
E. Settlements	NO	NO	NO	NO	NO	NO	0.00
F. Other land	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products							
H. Other							
5. Waste	40.83	40.69	39.61	38.20	39.16	38.21	-42.87
A. Solid waste disposal	30.88	30.92	29.70	28.09	27.65	26.22	-57.34
B. Biological treatment of solid waste	5.61	5.41	5.53	5.70	7.03	7.52	391.11
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	39.62
D. Waste water treatment and discharge	4.26	4.28	4.31	4.34	4.38	4.37	14.22
E. Other	0.08	0.08	0.07	0.07	0.10	0.10	27.14
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	0.00
Total CH_4 emissions without CH_4 from LULUCF	293.89	287.41	282.30	278.02	277.87	273.94	-10.18
Total CH_4 emissions with CH_4 from LULUCF	295.95	289.55	284.61	280.40	280.17	276.35	-9.61
Memo items:							
International bunkers	0.06	0.06	0.04	0.05	0.06	0.07	-8.31
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.26
Navigation	0.05	0.05	0.04	0.05	0.06	0.06	-9.34
Multilateral operations	NE	NE	NE	NE	NE	NE	0.00

TABLE A1.3 (CRF TABLE 10S4.1): DENMARK'S EMISSIONS OF NITROUS OXIDE (N_2O) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(kt)										
1. Energy	1.21	1.21	1.52	1.50	1.47	1.51	1.49	1.65	1.70	1.56	1.88
A. Fuel combustion (sectoral approach)	1.03	1.03	1.16	1.13	1.15	1.19	1.25	1.38	1.31	1.28	1.26
1. Energy industries	0.29	0.29	0.37	0.34	0.36	0.39	0.38	0.51	0.44	0.42	0.40
2. Manufacturing industries and construction	0.19	0.19	0.21	0.21	0.19	0.19	0.24	0.24	0.24	0.25	0.25
3. Transport	0.34	0.34	0.35	0.36	0.37	0.39	0.40	0.40	0.41	0.40	0.40
4. Other sectors	0.21	0.21	0.22	0.21	0.22	0.22	0.22	0.23	0.22	0.21	0.21
5. Other	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
B. Fugitive emissions from fuels	0.18	0.18	0.36	0.37	0.32	0.31	0.24	0.27	0.39	0.28	0.62
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and natural gas and other emissions from energy production	0.18	0.18	0.36	0.37	0.32	0.31	0.24	0.27	0.39	0.28	0.62
C. CO_2 transport and storage											
2. Industrial processes	3.42	3.42	3.14	2.78	2.63	2.66	2.98	2.76	2.80	2.67	3.14
A. Mineral industry											
B. Chemical industry	3.36	3.36	3.08	2.72	2.56	2.60	2.92	2.69	2.74	2.60	3.07
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Non-energy products from fuels and solvent use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. Electronic industry											
F. Product uses as ODS substitutes											
G. Other product manufacture and use	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.06	0.07	0.07
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	21.57	21.57	20.96	20.48	19.97	19.62	19.17	18.06	18.08	18.50	17.83
A. Enteric fermentation											
B. Manure management	3.28	3.28	3.31	3.41	3.39	3.26	3.14	3.14	3.18	3.29	3.20
C. Rice cultivation											
D. Agricultural soils	18.28	18.28	17.65	17.07	16.58	16.36	16.02	14.92	14.90	15.21	14.63
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field burning of agricultural residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Liming											
H. Urea application											
I. Other carbon containing fertlizers											
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land use, land-use change and forestry	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
A. Forest land	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
B. Cropland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. Grassland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. Settlements	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested wood products											
H. Other											
5. Waste	0.25	0.25	0.25	0.23	0.27	0.29	0.30	0.28	0.29	0.39	0.54
A. Solid waste disposal											
B. Biological treatment of solid waste	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.08	0.09	0.19	0.35
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	0.21	0.21	0.20	0.18	0.21	0.23	0.23	0.20	0.20	0.20	0.20
E. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total direct N_2O emissions without N_2O from LULUCF	26.45	26.45	25.87	24.99	24.34	24.08	23.94	22.75	22.87	23.12	23.39
Total direct N_2O emissions with N_2O from LULUCF	26.54	26.54	25.96	25.08	24.43	24.17	24.03	22.84	22.96	23.21	23.48
Memo items:											
International bunkers	0.13	0.13	0.12	0.13	0.16	0.18	0.19	0.18	0.18	0.18	0.18
Aviation	0.06	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08
Navigation	0.08	0.08	0.07	0.07	0.11	0.12	0.13	0.12	0.11	0.11	0.10
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO_2 emissions from biomass											
CO_2 captured											
Long-term storage of C in waste disposal sites											
Indirect N_2O	26.57	26.57	26.57	25.39	24.11	23.48	22.75	21.89	21.47	21.38	20.32

TABLE A1.3 (CRF TABLE 10S4.2): DENMARK'S EMISSIONS OF NITROUS OXIDE (N_2O) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	kt									
1. Energy	1.62	1.67	1.60	1.65	1.65	1.49	1.57	1.56	1.45	1.33
A. Fuel combustion (sectoral approach)	1.22	1.24	1.24	1.28	1.23	1.20	1.28	1.26	1.24	1.20
1. Energy industries	0.38	0.40	0.40	0.44	0.39	0.35	0.42	0.36	0.35	0.36
2. Manufacturing industries and construction	0.24	0.24	0.22	0.21	0.22	0.21	0.23	0.23	0.22	0.17
3. Transport	0.39	0.38	0.38	0.38	0.37	0.36	0.35	0.37	0.38	0.37
4. Other sectors	0.21	0.23	0.23	0.24	0.24	0.26	0.27	0.29	0.29	0.29
5. Other	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
B. Fugitive emissions from fuels	0.40	0.43	0.37	0.37	0.42	0.30	0.29	0.29	0.21	0.14
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and natural gas and other emissions from energy production	0.40	0.43	0.37	0.37	0.42	0.30	0.29	0.29	0.21	0.14
C. CO_2 transport and storage										
2. Industrial processes	3.31	2.92	2.57	2.96	1.79	0.06	0.07	0.08	0.06	0.08
A. Mineral industry										
B. Chemical industry	3.24	2.86	2.50	2.89	1.71	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Non-energy products from fuels and solvent use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. Electronic industry										
F. Product uses as ODS substitutes										
G. Other product manufacture and use	0.07	0.07	0.07	0.07	0.08	0.06	0.07	0.08	0.06	0.07
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	17.59	17.22	17.33	16.52	16.73	16.39	15.96	16.47	16.36	15.65
A. Enteric fermentation										
B. Manure management	3.19	3.30	3.38	3.34	3.45	3.25	3.02	3.01	2.83	2.67
C. Rice cultivation										
D. Agricultural soils	14.40	13.92	13.94	13.18	13.27	13.13	12.93	13.46	13.53	12.98
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field burning of agricultural residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. Liming										
H. Urea application										
I. Other carbon containing fertlizers										
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4. Land use, land-use change and forestry	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
A. Forest land	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
B. Cropland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. Grassland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. Settlements	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Harvested wood products										
H. Other										
5. Waste	0.73	0.70	1.01	0.94	0.38	0.41	0.42	0.51	0.56	0.51
A. Solid waste disposal										
B. Biological treatment of solid waste	0.51	0.50	0.77	0.75	0.20	0.20	0.24	0.29	0.29	0.33
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Waste water treatment and discharge	0.21	0.20	0.24	0.19	0.18	0.22	0.18	0.21	0.27	0.18
E. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total direct N_2O emissions without N_2O from LULUCF	23.24	22.52	22.51	22.08	20.55	18.36	18.01	18.61	18.43	17.57
Total direct N_2O emissions with N_2O from LULUCF	23.33	22.61	22.60	22.17	20.64	18.45	18.10	18.70	18.52	17.66
Memo items:										
International bunkers	0.18	0.16	0.14	0.14	0.14	0.14	0.16	0.17	0.16	0.12
Aviation	0.08	0.08	0.07	0.07	0.08	0.09	0.09	0.09	0.09	0.08
Navigation	0.10	0.08	0.07	0.07	0.06	0.06	0.08	0.08	0.07	0.04
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO_2 emissions from biomass										
CO_2 captured										
Long-term storage of C in waste disposal sites										
Indirect N_2O	19.69	19.28	18.48	18.06	18.32	18.24	17.37	17.85	18.60	17.56

TABLE A1.3 (CRF TABLE 10S4.3): DENMARK'S EMISSIONS OF NITROUS OXIDE (N_2O) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	kt						%
1. Energy	1.45	1.32	1.26	1.31	1.27	1.31	7.86
A. Fuel combustion (sectoral approach)	1.26	1.20	1.15	1.17	1.14	1.16	12.59
1. Energy industries	0.38	0.33	0.31	0.33	0.29	0.28	-4.14
2. Manufacturing industries and construction	0.19	0.18	0.16	0.15	0.15	0.15	-24.18
3. Transport	0.38	0.40	0.41	0.41	0.43	0.45	33.02
4. Other sectors	0.30	0.27	0.27	0.27	0.25	0.29	35.55
5. Other	0.01	0.01	0.01	0.01	0.01	0.01	45.37
B. Fugitive emissions from fuels	0.19	0.12	0.11	0.14	0.13	0.14	-19.62
1. Solid fuels	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	0.19	0.12	0.11	0.14	0.13	0.14	-19.62
C. CO_2 transport and storage							
2. Industrial processes	0.06	0.07	0.05	0.06	0.06	0.07	-98.05
A. Mineral industry							
B. Chemical industry	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	
C. Metal industry	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	0.00	0.00	0.00	0.00	0.00	0.00	234.56
E. Electronic industry							
F. Product uses as ODS substitutes							
G. Other product manufacture and use	0.06	0.07	0.05	0.06	0.06	0.07	9.76
H. Other	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	15.23	15.38	15.08	15.02	15.33	15.43	-28.48
A. Enteric fermentation							
B. Manure management	2.66	2.61	2.55	2.52	2.50	2.46	-25.18
C. Rice cultivation							
D. Agricultural soils	12.56	12.77	12.53	12.49	12.83	12.97	-29.07
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	0.00
F. Field burning of agricultural residues	0.00	0.00	0.00	0.00	0.00	0.00	37.71
G. Liming							
H. Urea application							
I. Other carbon containing fertlizers							
J. Other	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry	0.09	0.09	0.09	0.10	0.10	0.11	24.41
A. Forest land	0.08	0.08	0.08	0.08	0.08	0.08	-11.43
B. Cropland	0.00	0.00	0.00	0.00	0.00	0.01	8727.24
C. Grassland	0.00	0.00	0.00	0.00	0.00	0.01	10901.52
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	-49.87
E. Settlements	0.01	0.01	0.01	0.01	0.01	0.02	3794.46
F. Other land	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products							
H. Other							
5. Waste	0.51	0.51	0.49	0.51	0.59	0.59	139.03
A. Solid waste disposal							
B. Biological treatment of solid waste	0.31	0.30	0.30	0.31	0.38	0.38	836.61
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	39.62
D. Waste water treatment and discharge	0.19	0.20	0.18	0.20	0.20	0.21	2.01
E. Other	NA	NA	NA	NA	NA	NA	0.00
6. Other ***(as specified in summary 1.A)***	NO	NO	NO	NO	NO	NO	0.00
Total direct N_2O emissions without N_2O from LULUCF	17.24	17.29	16.89	16.90	17.25	17.39	-34.26
Total direct N_2O emissions with N_2O from LULUCF	17.33	17.38	16.98	17.00	17.35	17.50	-34.05
Memo items:							
International bunkers	0.13	0.14	0.12	0.13	0.15	0.15	10.47
Aviation	0.08	0.08	0.08	0.08	0.09	0.09	54.82
Navigation	0.05	0.05	0.04	0.05	0.06	0.06	-23.06
Multilateral operations	NE	NE	NE	NE	NE	NE	0.00
CO_2 emissions from biomass							
CO_2 captured							
Long-term storage of C in waste disposal sites							
Indirect N_2O	17.08	17.27	16.82	17.13	16.84	17.51	-34.08

TABLE A1.4 (CRF TABLE 10S5.1): DENMARK'S EMISSIONS OF INDUSTRIAL GREENHOUSE GASES (HFCS, PFCS, SF_6 AND NF_3 IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(kt)										
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	3.69	102.29	146.40	242.09	381.96	381.55	486.93	597.73
Emissions of HFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	3.69	102.29	146.34	241.46	379.86	376.35	475.46	581.99
HFC-23	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-32	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00
HFC-41	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-43-10mee	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-125	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.01	0.01	0.02	0.03
HFC-134	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-134a	NO,NA	NO,NA	NO,NA	0.00	0.07	0.10	0.15	0.21	0.18	0.22	0.23
HFC-143	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-143a	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.01	0.01	0.02	0.03
HFC-152	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-152a	NO,NA	NO,NA	NO,NA	0.00	0.03	0.05	0.04	0.03	0.02	0.01	0.04
HFC-161	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-227ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-236cb	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-236ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-236fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-245ca	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-245fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-365mfc	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Unspecified mix of HFCs[4] - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.44	3.50	7.20	9.79	12.38
Emissions of PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.07	0.63	2.09	5.20	11.47	15.74
CF_4	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C_2F_6	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C_3F_8	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00	0.00	0.00
C_4F_{10}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
$c-C_4F_8$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C_5F_{12}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C_6F_{14}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
$C_{10}F_{18}$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
$c-C_3F_6$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Unspecified mix of PFCs[4] - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Emissions of SF_6 - (kt CO_2 equivalent)	42.41	42.41	60.58	85.05	96.51	116.44	102.40	58.15	69.70	56.69	61.92
SF_6	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Emissions of NF_3 - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA

TABLE A1.4 (CRF TABLE 10S5.2): DENMARK'S EMISSIONS OF INDUSTRIAL GREENHOUSE GASES (HFCS, PFCS AND SF_6) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	kt									
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	726.10	763.57	808.04	836.64	895.82	951.41	978.95	1010.54	1011.37	971.18
Emissions of HFCs - (kt CO_2 equivalent)	703.54	735.66	780.03	812.05	875.28	932.64	957.80	989.36	992.93	951.20
HFC-23	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00
HFC-32	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
HFC-41	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-43-10mee	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-125	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.07	0.07
HFC-134	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-134a	0.26	0.27	0.29	0.28	0.29	0.29	0.29	0.30	0.29	0.26
HFC-143	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-143a	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.07
HFC-152	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-152a	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
HFC-161	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-227ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-236cb	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-236ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-236fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-245ca	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-245fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
HFC-365mfc	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Unspecified mix of HFCs(4) - (kt CO_2 equivalent)	17.04	20.10	21.21	20.83	21.50	22.32	23.06	24.17	28.98	31.18
Emissions of PFCs - (kt CO_2 equivalent)	22.57	27.91	28.01	24.59	20.53	18.77	21.15	21.19	18.44	19.98
CF_4	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00
C_2F_6	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C_3F_8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C_4F_{10}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
$c-C_4F_8$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00
C_5F_{12}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
C_6F_{14}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
$C_{10}F_{18}$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
$c-C_3F_6$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Unspecified mix of PFCs(4) - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Emissions of SF_6 - (kt CO_2 equivalent)	56.07	28.12	23.44	29.52	30.76	19.90	33.49	28.11	29.31	34.17
SF_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions of NF_3 - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA

TABLE A1.4 (CRF TABLE 10S5.3): DENMARK'S EMISSIONS OF INDUSTRIAL GREENHOUSE GASES (HFCS, PFCS AND SF_6) IN THE PERIOD 1990-2015

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	kt						%
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	969.09	902.15	813.21	791.79	710.34	638.88	100.00
Emissions of HFCs - (kt CO_2 equivalent)	950.42	886.47	801.04	780.95	701.67	633.93	100.00
HFC-23	0.00	0.00	0.00	NO,NA	0.00	NO,NA	0.00
HFC-32	0.01	0.01	0.01	0.01	0.01	0.01	100.00
HFC-41	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-43-10mee	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-125	0.07	0.06	0.06	0.05	0.05	0.05	100.00
HFC-134	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-134a	0.27	0.26	0.23	0.23	0.18	0.16	100.00
HFC-143	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-143a	0.06	0.06	0.05	0.05	0.05	0.04	100.00
HFC-152	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-152a	0.00	0.00	0.00	0.01	0.00	0.01	100.00
HFC-161	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-227ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-236cb	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-236ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-236fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-245ca	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-245fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-365mfc	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Unspecified mix of HFCs(4) - (kt CO_2 equivalent)	30.87	32.09	34.47	36.33	40.07	45.28	100.00
Emissions of PFCs - (kt CO_2 equivalent)	18.66	15.68	12.18	10.84	8.66	4.95	100.00
CF_4	0.00	0.00	0.00	0.00	0.00	NO,NA	0.00
C_2F_6	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
C_3F_8	0.00	0.00	0.00	0.00	0.00	0.00	100.00
C_4F_{10}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
c-C_4F_8	0.00	0.00	0.00	NO,NA	0.00	NO,NA	0.00
C_5F_{12}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
C_6F_{14}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
$C_{10}F_{18}$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
c-C_3F_6	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Unspecified mix of PFCs(4) - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Emissions of SF_6 - (kt CO_2 equivalent)	35.76	69.39	112.00	130.58	132.37	103.08	143.07
SF_6	0.00	0.00	0.00	0.01	0.01	0.00	143.07
Emissions of NF_3 - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00

TABLE A1.5 (CRF TABLE 10S6.1): DENMARK'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
CO_2 emissions without net CO_2 from LULUCF	53590.96	53590.96	64209.57	58401.78	60641.06	64701.36	61614.61	74862.71	65455.25	61217.42	58636.78
CO_2 emissions with net CO_2 from LULUCF	58446.78	58446.78	68424.18	63347.96	64840.96	68604.84	65750.54	78203.36	69283.14	65225.02	62704.34
CH_4 emissions without CH_4 from LULUCF	7624.36	7624.36	7813.92	7892.39	8087.28	7977.37	8051.45	8165.05	8054.88	8110.65	8016.16
CH_4 emissions with CH_4 from LULUCF	7643.30	7643.30	7833.92	7914.09	8110.68	8002.47	8078.25	8193.54	8085.07	8142.55	8049.72
N_2O emissions without N_2O from LULUCF	7881.70	7881.70	7708.97	7447.77	7252.30	7176.87	7133.96	6779.76	6814.26	6889.85	6970.03
N_2O emissions with N_2O from LULUCF	7909.06	7909.06	7735.96	7474.81	7279.37	7203.96	7161.06	6806.85	6841.32	6916.89	6997.00
HFCs	NO,NA	NO,NA	NO,NA	3.69	102.29	146.34	241.46	379.86	376.35	475.46	581.99
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.07	0.63	2.09	5.20	11.47	15.74
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	42.41	42.41	60.58	85.05	96.51	116.44	102.40	58.15	69.70	56.69	61.92
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	69139.43	69139.43	79793.03	73830.68	76179.43	80118.44	77144.51	90247.63	80775.63	76761.54	74282.63
Total (with LULUCF)	74041.55	74041.55	84054.64	78825.60	80429.81	84074.12	81334.34	93643.86	84660.78	80828.08	78410.71
Total (without LULUCF, with indirect)	70356.39	70356.39	81052.34	75059.09	77385.03	81280.22	78282.07	91371.58	81823.90	77765.66	75220.38
Total (with LULUCF, with indirect)	75258.52	75258.52	85313.95	80054.01	81635.40	85235.90	82471.90	94767.81	85709.04	81832.20	79348.46

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
1. Energy	52401.88	52401.88	63096.71	57276.24	59606.76	63658.95	60589.00	74004.42	64516.08	60430.50	58010.49
2. Industrial processes and product use	2343.35	2343.35	2469.51	2522.49	2592.39	2705.55	2878.22	3021.57	3104.95	3203.79	3441.67
3. Agriculture	12630.82	12630.82	12456.81	12281.49	12231.57	12074.76	12079.22	11659.68	11669.39	11682.38	11314.37
4. Land use, land-use change and forestry[(5)]	4902.13	4902.13	4261.61	4994.92	4250.37	3955.68	4189.83	3396.23	3885.14	4066.54	4128.09
5. Waste	1763.38	1763.38	1770.00	1750.46	1748.72	1679.19	1598.06	1561.96	1485.21	1444.88	1516.10
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)[(5)]	74041.55	74041.55	84054.64	78825.60	80429.81	84074.12	81334.34	93643.86	84660.78	80828.08	78410.71

TABLE A1.5 (CRF TABLE 10S6.2): DENMARK'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
CO_2 emissions without net CO_2 from LULUCF	54296.09	55869.71	55541.80	60625.25	55099.60	51521.63	59427.52	54643.91	51204.17	48814.51
CO_2 emissions with net CO_2 from LULUCF	58441.60	60770.78	61541.60	66236.73	60368.15	56691.09	64983.24	57470.84	49194.49	50968.74
CH_4 emissions without CH_4 from LULUCF	7907.27	8145.92	8073.65	8079.66	7904.84	7671.33	7575.70	7560.17	7429.35	7284.82
CH_4 emissions with CH_4 from LULUCF	7942.52	8182.86	8112.27	8119.97	7947.49	7715.09	7621.24	7607.45	7478.40	7335.62
N_2O emissions without N_2O from LULUCF	6926.32	6709.55	6707.40	6579.93	6124.05	5471.71	5367.80	5544.63	5492.58	5235.91
N_2O emissions with N_2O from LULUCF	6953.22	6736.36	6734.12	6606.53	6150.97	5498.59	5394.61	5571.35	5519.22	5262.44
HFCs	703.54	735.66	780.03	812.05	875.28	932.64	957.80	989.36	992.93	951.20
PFCs	22.57	27.91	28.01	24.59	20.53	18.77	21.15	21.19	18.44	19.98
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	56.07	28.12	23.44	29.52	30.76	19.90	33.49	28.11	29.31	34.17
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	69911.85	71516.87	71154.33	76150.99	70055.06	65635.97	73383.45	68787.36	65166.79	62340.57
Total (with LULUCF)	74119.51	76481.69	77219.48	81829.39	75393.19	70876.07	79011.52	71688.29	63232.79	64572.13
Total (without LULUCF, with indirect)	70786.20	72366.21	71965.47	76946.55	70819.42	66371.03	74080.91	69443.71	65794.52	62911.37
Total (with LULUCF, with indirect)	74993.85	77331.03	78030.63	82624.95	76157.54	71611.13	79708.98	72344.63	63860.52	65142.92

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
1. Energy	53539.64	55228.97	54806.24	60034.02	54473.55	50783.51	58678.32	53838.07	50596.63	48581.68
2. Industrial processes and product use	3631.06	3514.96	3467.91	3481.53	3312.43	2788.97	2848.10	2876.60	2574.66	2091.62
3. Agriculture	11227.90	11224.88	11302.85	11046.16	10983.24	10787.98	10525.38	10750.22	10693.69	10406.89
4. Land use, land-use change and forestry[(5)]	4207.65	4964.82	6065.15	5678.39	5338.12	5240.11	5628.08	2900.93	-1934.00	2231.56
5. Waste	1513.26	1548.06	1577.32	1589.29	1285.85	1275.50	1331.65	1322.47	1301.81	1260.37
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)[(5)]	74119.51	76481.69	77219.48	81829.39	75393.19	70876.07	79011.52	71688.29	63232.79	64572.13

TABLE A1.5 (CRF TABLE 10S6.3): DENMARK'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
CO_2 emissions without net CO_2 from LULUCF	49170.48	44169.64	39648.46	41632.49	37449.41	35146.53	-34.42
CO_2 emissions with net CO_2 from LULUCF	48294.65	41668.02	39310.50	42621.67	37506.36	39205.35	-32.92
CH_4 emissions without CH_4 from LULUCF	7347.34	7185.26	7057.42	6950.55	6946.81	6848.51	-10.18
CH_4 emissions with CH_4 from LULUCF	7398.80	7238.69	7115.34	7009.95	7004.33	6908.85	-9.61
N_2O emissions without N_2O from LULUCF	5138.50	5151.14	5031.94	5036.46	5140.79	5181.66	-34.26
N_2O emissions with N_2O from LULUCF	5165.52	5178.65	5059.88	5064.91	5170.24	5215.70	-34.05
HFCs	950.42	886.47	801.04	780.95	701.67	633.93	100.00
PFCs	18.66	15.68	12.18	10.84	8.66	4.95	100.00
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
SF_6	35.76	69.39	112.00	130.58	132.37	103.08	143.07
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Total (without LULUCF)	62661.17	57477.57	52663.03	54541.88	50379.72	47918.65	-30.69
Total (with LULUCF)	61863.82	55056.89	52410.93	55618.90	50523.64	52071.86	-29.67
Total (without LULUCF, with indirect)	63217.47	57982.07	53138.01	54992.85	50800.99	48331.14	-31.31
Total (with LULUCF, with indirect)	62420.12	55561.39	52885.92	56069.86	50944.91	52484.35	-30.26

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
1. Energy	49110.74	43786.84	39115.73	41008.25	36734.03	34475.82	-34.21
2. Industrial processes and product use	2034.33	2175.49	2121.15	2132.43	2071.28	1991.68	-15.01
3. Agriculture	10326.04	10328.39	10274.30	10277.98	10399.55	10298.62	-18.46
4. Land use, land-use change and forestry[(5)]	-797.35	-2420.68	-252.09	1077.02	143.92	4153.21	-15.28
5. Waste	1190.06	1186.86	1151.85	1123.22	1174.85	1152.53	-34.64
6. Other	NO	NO	NO	NO	NO	NO	0.00
Total (including LULUCF)[(5)]	61863.82	55056.89	52410.93	55618.90	50523.64	52071.86	-29.67

TABLE A1.6 (CRF TABLE 10S6.1): GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO₂ equivalent (kt)										
CO_2 emissions without net CO_2 from LULUCF	624.48	624.48	609.73	595.63	545.69	495.73	534.15	596.79	617.62	596.89	594.53
CO_2 emissions with net CO_2 from LULUCF	624.68	624.68	610.00	595.93	546.02	496.08	534.53	597.20	618.06	597.36	595.02
CH_4 emissions without CH_4 from LULUCF	16.06	16.06	16.19	15.45	14.59	15.16	15.86	16.22	17.01	16.49	15.66
CH_4 emissions with CH_4 from LULUCF	16.06	16.06	16.19	15.45	14.59	15.16	15.86	16.22	17.01	16.49	15.66
N_2O emissions without N_2O from LULUCF	11.94	11.94	11.92	11.71	11.40	11.37	11.64	12.44	12.27	12.72	12.81
N_2O emissions with N_2O from LULUCF	11.94	11.94	11.92	11.71	11.40	11.37	11.64	12.44	12.27	12.72	12.81
HFCs	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.02	0.03	0.09	0.45	0.83	1.50
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.03	0.00	0.00	0.00	0.00
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	652.48	652.48	637.84	622.79	571.68	522.27	561.71	625.54	647.37	626.94	624.50
Total (with LULUCF)	652.69	652.69	638.11	623.09	572.01	522.63	562.10	625.96	647.81	627.40	624.99
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO₂ equivalent (kt)										
1. Energy	625.20	625.20	610.35	596.17	545.95	495.67	534.28	597.08	617.81	596.54	594.31
2. Industrial processes and product use	0.31	0.31	0.30	0.30	0.31	0.33	0.38	0.33	0.77	1.18	1.89
3. Agriculture	9.51	9.51	9.59	8.63	7.61	8.29	8.90	9.73	10.18	10.27	9.62
4. Land use, land-use change and forestry[(5)]	0.21	0.21	0.27	0.30	0.33	0.36	0.38	0.41	0.44	0.47	0.50
5. Waste	17.47	17.47	17.59	17.69	17.81	17.98	18.16	18.40	18.61	18.95	18.67
6. Other											
Total (including LULUCF)[(5)]	652.69	652.69	638.11	623.09	572.01	522.63	562.10	625.96	647.81	627.40	624.99

TABLE A1.6 (CRF TABLE 10S6.2): GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
CO_2 emissions without net CO_2 from LULUCF	667.50	618.07	579.80	649.84	639.92	644.11	662.24	653.19	677.77	592.96
CO_2 emissions with net CO_2 from LULUCF	668.02	618.68	579.88	650.56	640.76	644.74	662.86	654.13	678.62	593.11
CH_4 emissions without CH_4 from LULUCF	15.32	15.34	14.91	15.03	15.32	15.56	15.38	15.42	15.26	14.93
CH_4 emissions with CH_4 from LULUCF	15.32	15.34	14.91	15.03	15.32	15.56	15.38	15.42	15.26	14.93
N_2O emissions without N_2O from LULUCF	12.67	12.57	12.31	12.58	12.78	12.92	13.15	12.82	14.32	11.83
N_2O emissions with N_2O from LULUCF	12.67	12.57	12.31	12.58	12.78	12.92	13.15	12.82	14.32	11.83
HFCs	2.19	3.47	4.57	5.57	6.35	6.41	6.45	7.00	7.50	7.55
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	697.68	649.46	611.60	683.03	674.38	679.00	697.22	688.43	714.85	627.27
Total (with LULUCF)	698.20	650.07	611.67	683.74	675.21	679.63	697.84	689.38	715.70	627.42
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
1. Energy	667.97	618.23	579.80	650.20	640.54	644.65	663.14	653.92	678.70	593.34
2. Industrial processes and product use	2.50	3.76	4.89	6.05	6.78	6.90	6.80	7.36	7.86	8.00
3. Agriculture	9.13	9.32	8.90	9.03	9.53	9.93	9.73	9.59	10.47	9.45
4. Land use, land-use change and forestry[(5)]	0.52	0.60	0.08	0.71	0.83	0.63	0.61	0.95	0.85	0.15
5. Waste	18.07	18.15	18.00	17.75	17.53	17.52	17.55	17.56	17.81	16.47
6. Other										
Total (including LULUCF)[(5)]	698.20	650.07	611.67	683.74	675.21	679.63	697.84	689.38	715.70	627.42

TABLE A1.6 (CRF TABLE 10S6.3): GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
CO_2 emissions without net CO_2 from LULUCF	678.87	725.34	578.50	561.29	520.79	523.86	-16.11
CO_2 emissions with net CO_2 from LULUCF	680.28	726.54	579.82	562.40	521.93	524.90	-15.97
CH_4 emissions without CH_4 from LULUCF	15.16	15.05	14.85	14.79	14.30	13.89	-13.50
CH_4 emissions with CH_4 from LULUCF	15.16	15.05	14.85	14.79	14.30	13.89	-13.50
N_2O emissions without N_2O from LULUCF	11.73	12.21	11.25	10.02	9.83	9.48	-20.60
N_2O emissions with N_2O from LULUCF	11.73	12.21	11.25	10.02	9.83	9.48	-20.60
HFCs	7.77	8.18	8.37	8.99	8.53	10.18	100.00
PFCs	NO	NO	NO	NO	NO	NO	0.00
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	0.00
SF_6	0.00	0.00	0.00	0.00	0.00	0.00	100.00
NF_3	NO	NO	NO	NO	NO	NO	0.00
Total (without LULUCF)	713.53	760.78	612.97	595.09	553.45	557.41	-14.57
Total (with LULUCF)	714.95	761.99	614.29	596.21	554.59	558.46	-14.44
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	0.00
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	0.00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
1. Energy	679.61	726.28	578.86	561.62	520.87	523.96	-16.19
2. Industrial processes and product use	8.11	8.52	8.75	9.31	8.86	10.49	3329.22
3. Agriculture	9.60	9.66	9.48	9.41	9.15	8.55	-10.17
4. Land use, land-use change and forestry[(5)]	1.42	1.21	1.32	1.12	1.13	1.04	406.18
5. Waste	16.22	16.32	15.88	14.75	14.57	14.41	-17.49
6. Other							
Total (including LULUCF)[(5)]	714.95	761.99	614.29	596.21	554.59	558.46	-14.44

TABLE A1.7 (CRF TABLE 10S6.1): FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
CO_2 emissions without net CO_2 from LULUCF	667.99	667.99	648.76	638.31	528.71	533.73	539.67	559.91	555.53	599.15	628.42
CO_2 emissions with net CO_2 from LULUCF	667.99	667.99	648.76	638.31	528.71	533.73	539.67	559.91	555.53	599.15	628.42
CH_4 emissions without CH_4 from LULUCF	22.50	22.50	21.50	21.72	21.82	23.07	23.18	23.03	23.04	22.84	22.89
CH_4 emissions with CH_4 from LULUCF	22.50	22.50	21.50	21.72	21.82	23.07	23.18	23.03	23.04	22.84	22.89
N_2O emissions without N_2O from LULUCF	10.37	10.37	10.00	9.93	9.35	9.63	9.62	9.69	9.68	9.97	10.01
N_2O emissions with N_2O from LULUCF	10.37	10.37	10.00	9.93	9.35	9.63	9.62	9.69	9.68	9.97	10.01
HFCs	NO	NO	NO	NO	NO	0.00	0.00	0.03	0.74	1.41	3.76
PFCs											
Unspecified mix of HFCs and PFCs											
SF_6	NA,NO	NA,NO	NA,NO	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.09
NF_3											
Total (without LULUCF)	700.86	700.86	680.25	670.07	560.00	566.57	572.60	592.82	589.16	633.54	665.17
Total (with LULUCF)	700.86	700.86	680.25	670.07	560.00	566.57	572.60	592.82	589.16	633.54	665.17
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
1. Energy	673.28	673.28	653.84	643.27	533.01	538.08	544.09	564.49	560.13	604.13	633.42
2. Industrial processes and product use	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.11	0.12	0.14	0.15	0.19	0.91	1.58	3.85
3. Agriculture	27.58	27.58	26.41	26.68	26.87	28.36	28.36	28.14	28.12	27.82	27.90
4. Land use, land-use change and forestry(5)											
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE
6. Other											
Total (including LULUCF)(5)	700.86	700.86	680.25	670.07	560.00	566.57	572.60	592.82	589.16	633.54	665.17

TABLE A1.7 (CRF TABLE 10S6.2): FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
CO_2 emissions without net CO_2 from LULUCF	665.02	820.31	768.75	773.61	774.53	774.76	768.29	797.42	732.40	764.63
CO_2 emissions with net CO_2 from LULUCF	665.02	820.31	768.75	773.61	774.53	774.76	768.29	797.42	732.40	764.63
CH_4 emissions without CH_4 from LULUCF	23.06	22.46	22.46	22.43	22.25	21.80	21.52	21.58	21.23	21.44
CH_4 emissions with CH_4 from LULUCF	23.06	22.46	22.46	22.43	22.25	21.80	21.52	21.58	21.23	21.44
N_2O emissions without N_2O from LULUCF	10.21	11.30	10.99	11.21	11.18	11.08	11.04	11.12	10.51	10.75
N_2O emissions with N_2O from LULUCF	10.21	11.30	10.99	11.21	11.18	11.08	11.04	11.12	10.51	10.75
HFCs	5.01	8.08	10.15	11.92	13.30	13.03	13.54	14.00	14.31	13.34
PFCs										
Unspecified mix of HFCs and PFCs										
SF_6	0.08	0.08	0.09	0.08	0.18	0.15	0.13	0.13	0.15	0.20
NF_3										
Total (without LULUCF)	703.38	862.22	812.44	819.25	821.43	820.83	814.52	844.25	778.61	810.36
Total (with LULUCF)	703.38	862.22	812.44	819.25	821.43	820.83	814.52	844.25	778.61	810.36
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
1. Energy	670.16	825.68	773.76	778.84	779.72	779.94	773.46	802.65	737.02	769.46
2. Industrial processes and product use	5.08	8.15	10.24	11.99	13.48	13.18	13.68	14.13	14.46	13.54
3. Agriculture	28.14	28.39	28.44	28.42	28.23	27.71	27.38	27.47	27.13	27.36
4. Land use, land-use change and forestry(5)										
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE
6. Other										
Total (including LULUCF)(5)	703.38	862.22	812.44	819.25	821.43	820.83	814.52	844.25	778.61	810.36

TABLE A1.7 (CRF TABLE 10S6.3): FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
CO_2 emissions without net CO_2 from LULUCF	839.53	722.61	808.17	778.06	808.64	779.07	16.63
CO_2 emissions with net CO_2 from LULUCF	839.53	722.61	808.17	778.06	808.64	779.07	16.63
CH_4 emissions without CH_4 from LULUCF	21.33	21.24	21.53	21.48	21.43	21.59	-4.04
CH_4 emissions with CH_4 from LULUCF	21.33	21.24	21.53	21.48	21.43	21.59	-4.04
N_2O emissions without N_2O from LULUCF	11.16	10.44	11.03	11.00	11.43	11.30	8.97
N_2O emissions with N_2O from LULUCF	11.16	10.44	11.03	11.00	11.43	11.30	8.97
HFCs	13.90	13.97	16.95	20.95	25.56	32.76	100.00
PFCs							
Unspecified mix of HFCs and PFCs							
SF_6	0.16	0.15	0.18	0.20	0.59	0.25	100.00
NF_3							
Total (without LULUCF)	886.09	768.41	857.86	831.69	867.65	844.96	20.56
Total (with LULUCF)	886.09	768.41	857.86	831.69	867.65	844.96	20.56
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	0.00
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	0.00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
1. Energy	844.83	727.11	813.29	783.10	814.14	784.42	16.51
2. Industrial processes and product use	14.07	14.12	17.13	21.15	26.15	33.00	100.00
3. Agriculture	27.20	27.18	27.44	27.44	27.36	27.54	-0.14
4. Land use, land-use change and forestry[(5)]							
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	0.00
6. Other							
Total (including LULUCF)[(5)]	886.09	768.41	857.86	831.69	867.65	844.96	20.56

TABLE A1.8 (CRF TABLE 10S6.1): DENMARK'S AND GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
CO_2 emissions without net CO_2 from LULUCF	54215.44	54215.44	64819.29	58997.41	61186.75	65197.09	62148.76	75459.50	66072.87	61814.31	59231.31
CO_2 emissions with net CO_2 from LULUCF	59071.47	59071.47	69034.18	63943.89	65386.98	69100.92	66285.07	78800.57	69901.20	65822.38	63299.37
CH_4 emissions without CH_4 from LULUCF	7640.41	7640.41	7830.11	7907.84	8101.87	7992.53	8067.32	8181.28	8071.90	8127.14	8031.82
CH_4 emissions with CH_4 from LULUCF	7659.36	7659.36	7850.10	7929.54	8125.27	8017.63	8094.12	8209.77	8102.08	8159.04	8065.38
N_2O emissions without N_2O from LULUCF	7893.64	7893.64	7720.89	7459.48	7263.69	7188.24	7145.60	6792.20	6826.53	6902.57	6982.84
N_2O emissions with N_2O from LULUCF	7921.01	7921.01	7747.88	7486.52	7290.77	7215.33	7172.70	6819.28	6853.59	6929.61	7009.80
HFCs	NO,NE,NA	NO,NE,NA	NO,NE,NA	3.69	102.29	146.36	241.48	379.95	376.81	476.29	583.49
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.07	0.63	2.09	5.20	11.47	15.74
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	42.41	42.41	60.58	85.05	96.51	116.44	102.43	58.16	69.70	56.69	61.92
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	69791.91	69791.91	80430.87	74453.47	76751.11	80640.72	77706.23	90873.18	81423.00	77388.48	74907.12
Total (with LULUCF)	74694.24	74694.24	84692.75	79448.69	81001.81	84596.75	81896.44	94269.82	85308.58	81455.48	79035.70
Total (without LULUCF, with indirect)	71008.87	71008.87	81690.18	75681.88	77956.71	81802.50	78843.78	91997.12	82471.27	78392.60	75844.87
Total (with LULUCF, with indirect)	75911.21	75911.21	85952.06	80677.10	82207.41	85758.53	83033.99	95393.77	86356.85	82459.60	79973.45

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
1. Energy	53027.08	53027.08	63707.06	57872.41	60152.70	64154.62	61123.28	74601.50	65133.89	61027.04	58604.80
2. Industrial processes and product use	2343.66	2343.66	2469.81	2522.79	2592.70	2705.88	2878.61	3021.90	3105.72	3204.97	3443.56
3. Agriculture	12640.33	12640.33	12466.41	12290.12	12239.17	12083.05	12088.12	11669.41	11679.57	11692.64	11323.99
4. Land use, land-use change and forestry(5)	4902.33	4902.33	4261.88	4995.22	4250.70	3956.03	4190.21	3396.64	3885.58	4067.00	4128.58
5. Waste	1780.84	1780.84	1787.59	1768.15	1766.53	1697.17	1616.22	1580.36	1503.82	1463.83	1534.77
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)(5)	74694.24	74694.24	84692.75	79448.69	81001.81	84596.75	81896.44	94269.82	85308.58	81455.48	79035.70

TABLE A1.8 (CRF TABLE 10S6.2): DENMARK'S AND GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
CO_2 emissions without net CO_2 from LULUCF	54963.58	56487.78	56121.60	61275.09	55739.52	52165.74	60089.76	55297.10	51881.94	49407.47
CO_2 emissions with net CO_2 from LULUCF	59109.62	61389.45	62121.48	66887.29	61008.91	57335.83	65646.10	58124.97	49873.11	51561.84
CH_4 emissions without CH_4 from LULUCF	7922.59	8161.26	8088.56	8094.70	7920.16	7686.89	7591.08	7575.59	7444.62	7299.74
CH_4 emissions with CH_4 from LULUCF	7957.84	8198.20	8127.19	8135.00	7962.81	7730.65	7636.62	7622.87	7493.66	7350.54
N_2O emissions without N_2O from LULUCF	6938.99	6722.12	6719.71	6592.51	6136.83	5484.63	5380.94	5557.45	5506.90	5247.74
N_2O emissions with N_2O from LULUCF	6965.89	6748.93	6746.43	6619.12	6163.75	5511.51	5407.76	5584.17	5533.53	5274.27
HFCs	705.73	739.13	784.60	817.61	881.63	939.05	964.24	996.36	1000.43	958.74
PFCs	22.57	27.91	28.01	24.59	20.53	18.77	21.15	21.19	18.44	19.98
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	56.07	28.12	23.44	29.52	30.76	19.90	33.49	28.11	29.31	34.17
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	70609.53	72166.33	71765.92	76834.02	70729.44	66314.96	74080.67	69475.79	65881.64	62967.84
Total (with LULUCF)	74817.71	77131.76	77831.15	82513.13	76068.39	71555.70	79709.36	72377.66	63948.49	65199.55
Total (without LULUCF, with indirect)	71483.88	73015.67	72577.07	77629.58	71493.79	67050.02	74778.13	70132.14	66509.37	63538.64
Total (with LULUCF, with indirect)	75692.05	77981.10	78642.30	83308.69	76832.75	72290.76	80406.82	73034.01	64576.22	65770.34

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
1. Energy	54207.61	55847.20	55386.04	60684.22	55114.08	51428.16	59341.45	54491.99	51275.33	49175.02
2. Industrial processes and product use	3633.55	3518.72	3472.81	3487.57	3319.20	2795.87	2854.90	2883.96	2582.52	2099.62
3. Agriculture	11237.03	11234.20	11311.76	11055.20	10992.76	10797.92	10535.12	10759.81	10704.16	10416.35
4. Land use, land-use change and forestry(5)	4208.18	4965.43	6065.23	5679.11	5338.96	5240.74	5628.69	2901.87	-1933.15	2231.71
5. Waste	1531.33	1566.21	1595.32	1607.03	1303.39	1293.02	1349.20	1340.03	1319.62	1276.85
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)(5)	74817.71	77131.76	77831.15	82513.13	76068.39	71555.70	79709.36	72377.66	63948.49	65199.55

TABLE A1.8 (CRF TABLE 10S6.3): DENMARK'S AND GREENLAND'S TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
CO_2 emissions without net CO_2 from LULUCF	49849.35	44894.98	40226.96	42193.78	37970.20	35670.39	-34.21
CO_2 emissions with net CO_2 from LULUCF	48974.93	42394.56	39890.32	43184.07	38028.29	39730.26	-32.74
CH_4 emissions without CH_4 from LULUCF	7362.50	7200.31	7072.27	6965.34	6961.11	6862.40	-10.18
CH_4 emissions with CH_4 from LULUCF	7413.96	7253.74	7130.19	7024.73	7018.63	6922.74	-9.62
N_2O emissions without N_2O from LULUCF	5150.24	5163.35	5043.19	5046.49	5150.62	5191.14	-34.24
N_2O emissions with N_2O from LULUCF	5177.26	5190.86	5071.13	5074.93	5180.07	5225.19	-34.03
HFCs	958.19	894.65	809.41	789.95	710.20	644.10	100.00
PFCs	18.66	15.68	12.18	10.84	8.66	4.95	100.00
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
SF_6	35.76	69.39	112.00	130.59	132.37	103.08	143.08
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Total (without LULUCF)	63374.70	58238.35	53276.00	55136.97	50933.17	48476.07	-30.54
Total (with LULUCF)	62578.77	55818.88	53025.22	56215.11	51078.22	52630.32	-29.54
Total (without LULUCF, with indirect)	63931.00	58742.86	53750.99	55587.94	51354.44	48888.55	-31.15
Total (with LULUCF, with indirect)	63135.06	56323.38	53500.21	56666.08	51499.49	53042.80	-30.13

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
1. Energy	49790.35	44513.11	39694.60	41569.87	37254.91	34999.78	-34.00
2. Industrial processes and product use	2042.44	2184.01	2129.89	2141.74	2080.15	2002.18	-14.57
3. Agriculture	10335.63	10338.05	10283.78	10287.39	10408.70	10307.17	-18.46
4. Land use, land-use change and forestry[(5)]	-795.93	-2419.48	-250.78	1078.14	145.06	4154.25	-15.26
5. Waste	1206.28	1203.18	1167.73	1137.97	1189.42	1166.94	-34.47
6. Other	NO	NO	NO	NO	NO	NO	0.00
Total (including LULUCF)[(5)]	62578.77	55818.88	53025.22	56215.11	51078.22	52630.32	-29.54

TABLE A1.9 (CRF TABLE 10S6.1): DENMARK'S, GREENLAND'S AND FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
CO_2 emissions without net CO_2 from LULUCF	54883.43	54883.43	65468.05	59635.72	61715.46	65730.82	62688.42	76019.41	66628.40	62413.46	59859.74
CO_2 emissions with net CO_2 from LULUCF	59739.46	59739.46	69682.94	64582.19	65915.69	69634.65	66824.74	79360.48	70456.74	66421.53	63927.79
CH_4 emissions without CH_4 from LULUCF	7662.91	7662.91	7851.61	7929.56	8123.69	8015.60	8090.49	8204.30	8094.94	8149.98	8054.71
CH_4 emissions with CH_4 from LULUCF	7681.85	7681.85	7871.60	7951.26	8147.09	8040.71	8117.29	8232.79	8125.13	8181.88	8088.27
N_2O emissions without N_2O from LULUCF	7904.01	7904.01	7730.89	7469.40	7273.04	7197.86	7155.22	6801.89	6836.21	6912.54	6992.85
N_2O emissions with N_2O from LULUCF	7931.38	7931.38	7757.88	7496.45	7300.12	7224.96	7182.32	6828.98	6863.27	6939.57	7019.81
HFCs	NO,NE,NA	NO,NE,NA	NO,NE,NA	3.69	102.29	146.36	241.48	379.98	377.54	477.70	587.25
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.07	0.63	2.09	5.20	11.47	15.74
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	42.41	42.41	60.58	85.16	96.64	116.58	102.58	58.31	69.87	56.87	62.01
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	70492.77	70492.77	81111.12	75123.54	77311.11	81207.29	78278.83	91466.00	82012.16	78022.02	75572.29
Total (with LULUCF)	75395.10	75395.10	85373.00	80118.76	81561.82	85163.32	82469.05	94862.64	85897.74	82089.02	79700.87
Total (without LULUCF, with indirect)	71709.73	71709.73	82370.43	76351.95	78516.71	82369.06	79416.38	92589.94	83060.43	79026.14	76510.04
Total (with LULUCF, with indirect)	76612.07	76612.07	86632.31	81347.17	82767.41	86325.10	83606.60	95986.59	86946.01	83093.14	80638.62

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (kt)										
1. Energy	53700.36	53700.36	64360.91	58515.68	60685.71	64692.69	61667.37	75166.00	65694.03	61631.17	59238.22
2. Industrial processes and product use	2343.66	2343.66	2469.81	2522.90	2592.83	2706.01	2878.75	3022.09	3106.63	3206.55	3447.41
3. Agriculture	12667.91	12667.91	12492.82	12316.80	12266.05	12111.41	12116.49	11697.55	11707.69	11720.47	11351.89
4. Land use, land-use change and forestry[5]	4902.33	4902.33	4261.88	4995.22	4250.70	3956.03	4190.21	3396.64	3885.58	4067.00	4128.58
5. Waste	1780.84	1780.84	1787.59	1768.15	1766.53	1697.17	1616.22	1580.36	1503.82	1463.83	1534.77
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)[5]	75395.10	75395.10	85373.00	80118.76	81561.82	85163.32	82469.05	94862.64	85897.74	82089.02	79700.87

TABLE A1.9 (CRF TABLE 10S6.2): DENMARK'S, GREENLAND'S AND FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
CO_2 emissions without net CO_2 from LULUCF	55628.61	57308.09	56890.35	62048.70	56514.05	52940.50	60858.05	56094.52	52614.34	50172.10
CO_2 emissions with net CO_2 from LULUCF	59774.64	62209.77	62890.23	67660.90	61783.44	58110.59	66414.39	58922.39	50605.52	52326.48
CH_4 emissions without CH_4 from LULUCF	7945.65	8183.72	8111.02	8117.13	7942.41	7708.69	7612.60	7597.17	7465.85	7321.18
CH_4 emissions with CH_4 from LULUCF	7980.90	8220.66	8149.64	8157.43	7985.06	7752.46	7658.14	7644.45	7514.89	7371.98
N_2O emissions without N_2O from LULUCF	6949.20	6733.42	6730.71	6603.72	6148.01	5495.71	5391.98	5568.57	5517.41	5258.49
N_2O emissions with N_2O from LULUCF	6976.10	6760.23	6757.43	6630.33	6174.92	5522.59	5418.79	5595.29	5544.04	5285.02
HFCs	710.73	747.21	794.75	829.53	894.93	952.08	977.79	1010.36	1014.74	972.08
PFCs	22.57	27.91	28.01	24.59	20.53	18.77	21.15	21.19	18.44	19.98
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
SF_6	56.15	28.20	23.53	29.59	30.94	20.05	33.62	28.24	29.46	34.37
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Total (without LULUCF)	71312.91	73028.55	72578.36	77653.27	71550.87	67135.79	74895.19	70320.04	66660.25	63778.20
Total (with LULUCF)	75521.09	77993.97	78643.59	83332.37	76889.83	72376.53	80523.88	73221.91	64727.10	66009.91
Total (without LULUCF, with indirect)	72187.25	73877.89	73389.51	78448.82	72315.23	67870.85	75592.65	70976.38	67287.98	64349.00
Total (with LULUCF, with indirect)	76395.43	78843.32	79454.74	84127.93	77654.18	73111.59	81221.34	73878.25	65354.83	66580.70

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	CO2 equivalent (kt)									
1. Energy	54877.78	56672.88	56159.80	61463.05	55893.81	52208.09	60114.92	55294.65	52012.35	49944.48
2. Industrial processes and product use	3638.64	3526.87	3483.05	3499.56	3332.68	2809.05	2868.58	2898.08	2596.98	2113.16
3. Agriculture	11265.17	11262.59	11340.20	11083.61	11021.00	10825.63	10562.50	10787.28	10731.30	10443.71
4. Land use, land-use change and forestry[(5)]	4208.18	4965.43	6065.23	5679.11	5338.96	5240.74	5628.69	2901.87	-1933.15	2231.71
5. Waste	1531.33	1566.21	1595.32	1607.03	1303.39	1293.02	1349.20	1340.03	1319.62	1276.85
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)[(5)]	75521.09	77993.97	78643.59	83332.37	76889.83	72376.53	80523.88	73221.91	64727.10	66009.91

TABLE A1.9 (CRF TABLE 10S6.3): DENMARK'S, GREENLAND'S AND FAROE ISLANDS' TOTAL EMISSIONS AND REMOVALS OF GREENHOUSE GASES IN THE PERIOD 1990-2015

GREENHOUSE GAS EMISSIONS	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
CO_2 emissions without net CO_2 from LULUCF	50688.88	45617.59	41035.13	42971.83	38778.84	36449.46	-33.59
CO_2 emissions with net CO_2 from LULUCF	49814.47	43117.17	40698.49	43962.13	38836.93	40509.32	-32.19
CH_4 emissions without CH_4 from LULUCF	7383.83	7221.55	7093.80	6986.82	6982.55	6883.99	-10.16
CH_4 emissions with CH_4 from LULUCF	7435.29	7274.98	7151.72	7046.22	7040.06	6944.33	-9.60
N_2O emissions without N_2O from LULUCF	5161.40	5173.79	5054.22	5057.49	5162.05	5202.44	-34.18
N_2O emissions with N_2O from LULUCF	5188.42	5201.30	5082.16	5085.93	5191.50	5236.49	-33.98
HFCs	972.10	908.62	826.35	810.89	735.76	676.86	100.00
PFCs	18.66	15.68	12.18	10.84	8.66	4.95	100.00
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
SF_6	35.93	69.54	112.18	130.79	132.96	103.33	143.66
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Total (without LULUCF)	64260.79	59006.77	54133.86	55968.67	51800.82	49321.03	-30.03
Total (with LULUCF)	63464.86	56587.29	53883.08	57046.80	51945.87	53475.28	-29.07
Total (without LULUCF, with indirect)	64817.09	59511.27	54608.85	56419.63	52222.09	49733.51	-30.65
Total (with LULUCF, with indirect)	64021.15	57091.79	54358.07	57497.77	52367.14	53887.76	-29.66

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO2 equivalent (kt)						(%)
1. Energy	50635.18	45240.22	40507.89	42352.98	38069.05	35784.20	-33.36
2. Industrial processes and product use	2056.51	2198.13	2147.02	2162.89	2106.30	2035.18	-13.16
3. Agriculture	10362.83	10365.23	10311.22	10314.83	10436.06	10334.70	-18.42
4. Land use, land-use change and forestry[(5)]	-795.93	-2419.48	-250.78	1078.14	145.06	4154.25	-15.26
5. Waste	1206.28	1203.18	1167.73	1137.97	1189.42	1166.94	-34.47
6. Other	NO	NO	NO	NO	NO	NO	0.00
Total (including LULUCF)[(5)]	63464.86	56587.29	53883.08	57046.80	51945.87	53475.28	-29.07

Annex A2 Danish National Allocation tables for installations and aviation in accordance with phase 3 of the EU ETS (2013-2020)

TABLE A2.1: DANISH NATIONAL ALLOCATION TABLE FOR THE PERIOD 2013-2020 FOR INSTALLATIONS AND AVIATION

Danish National Allocation table for the period 2013-2020 for Installations (NIM)

Please note: changes in the allocation regarding cessation, partial cessation, capacity changes and changes in carbon leakage status after first of January 2013 are not reflected in the table.
Information on the actual allocations is contained in the EU Transaction Log available from the website of the European Commission: http://ec.europa.eu/environment/ets/

Installation ID (Union registry)	Operator	Installation	Preliminary allocation							
			2013	2014	2015	2016	2017	2018	2019	2020
2	Brøndby Fjernvarme A.m.b.a.	Brøndby Strand Fjernvarmecentral	696	623	552	483	416	351	289	228
3	Viborg Kraftvarme A/S	Viborg Kraftvarme A/S	2.546	2.279	2.018	1.766	1.521	1.284	1.056	835
4	Viborg Kraftvarme A/S	Viborg Kraftvarme A/S	3.792	3.393	3.006	2.630	2.266	1.913	1.572	1.243
5	Viborg Kraftvarme A/S	Viborg Kraftvarme A/S	51.242	45.857	40.624	35.558	30.649	25.901	21.305	16.875
6	HOFOR Fjernvarme P/S	HOFOR - Lygten Varmeværk	2.773	2.483	2.199	1.924	1.658	1.399	1.150	909
7	HOFOR Fjernvarme P/S	HOFOR - Østre varmecentral	2.366	2.118	1.876	1.641	1.414	1.194	981	776
8	HOFOR Fjernvarme P/S	HOFOR - Sundholm varmecentral	2.736	2.448	2.169	1.898	1.635	1.380	1.134	897
10	Brædstrup Totalenergianlæg A/S	Brædstrup Totalenergianlæg A/S	7.386	6.609	5.855	5.125	4.418	3.733	3.071	2.433
11	Farum Fjernvarme AMBA	Farum Fjernvarme	1.450	1.298	1.150	1.006	866	732	601	476
12	Farum Fjernvarme AMBA	Farum Fjernvarme	3.640	3.257	2.885	2.525	2.175	1.836	1.508	1.194
14	Værløse Varmeværk AMBA	Værløse Varmeværk	1.703	1.525	1.350	1.181	1.018	860	706	559
16	Silkeborg Varme A/S	Silkeborg Varme A/S - Fjernvarmeværket Hostrupsgade	5.658	5.064	4.485	3.925	3.381	2.855	2.346	1.856
17	Silkeborg Varme A/S	Silkeborg Varme A/S - Varmeværket Kejlstrupvej	1.588	1.421	1.258	1.101	949	801	658	521
18	Andelsselskabet Oksbøl Varmeværk	Oksbøl Varmeværk	5.988	5.359	4.747	4.155	3.582	3.027	2.490	1.972
19	Brørup Fjernvarme AMBA	Brørup Fjernvarme	5.370	4.806	4.257	3.727	3.212	2.714	2.233	1.769
20	Lem Varmeværk	Lem Varmeværk	8.156	7.299	6.466	5.659	4.878	4.122	3.391	2.686
22	Aalborg Kommune	Lyngvej Central	206	185	164	143	124	104	86	68
23	Aalborg Kommune	Svendborgvej Central	1.117	1.000	885	774	668	564	463	366
24	Aalborg Kommune	Borgmester Jørgensensvej Central	51	45	40	35	30	26	21	16
25	Aalborg Kommune	Højvang Varmecentral	17	16	14	12	11	9	8	6
26	Aalborg Kommune	Gasværksvej Varmecentral	2.879	2.576	2.282	1.997	1.720	1.453	1.194	944
27	Støvring Kraftvarmeværk AMBA	Støvring Kraftvarmeværk	11.587	10.369	9.186	8.040	6.931	5.857	4.817	3.816
28	Bjerringbro Varmeværk AMBA	Bjerringbro Kraftvarmeværk	8.997	8.051	7.133	6.243	5.381	4.548	3.741	2.963
29	Nørre Aaby Kraftvarmeværk AMBA	Nørre-Aaby Kraftvarmeværk A.M.B.A.	3.559	3.186	2.821	2.470	2.129	1.799	1.480	1.172
30	Jetsmark Energiværk AMBA	Jetsmark Energiværk A.m.b.a.	7.382	6.606	5.852	5.122	4.415	3.731	3.069	2.431
31	TRE-FOR Varme A/S	Kolding Varmeværk Syd	1.153	1.032	914	800	689	582	478	378
32	TRE-FOR Varme A/S	Kolding Varmeværk Dampcentralen	455	408	361	316	272	230	189	149
33	TRE-FOR Varme A/S	Kolding Varmeværk Skovparken	259	233	206	180	155	131	108	85
34	TRE-FOR Varme A/S	Kolding Varmeværk Strandhuse	304	272	241	212	182	154	126	100
35	TRE-FOR Varme A/S	Fredericia Varmeværk, Erritsø	98	88	77	68	59	50	40	32
36	TRE-FOR Varme A/S	Vejle Varmeværk Nørremarkens Kedelcentral	552	495	439	383	330	279	229	181
37	TRE-FOR Varme A/S	Vejle Varmeværk Søndermarkens Kedelcentral	564	504	447	391	336	284	233	185
38	Bjerringbro Varmeværk AMBA	Bjerringbro Varmeværk	10.051	8.995	7.967	6.971	6.005	5.071	4.167	3.296
39	Sønderborg Kraftvarmeværk I/S	Sønderborg Kraftvarme I/S	44.974	40.247	35.654	31.207	26.900	22.733	18.699	14.811
40	Jægerspris Kraftvarme A.M.B.A	Jægerspris Kraftvarme	6.793	6.079	5.385	4.713	4.063	3.434	2.825	2.237
42	DONG Energy Thermal Power A/S	Avedøreværket	648.326	538.566	466.851	408.622	352.222	297.650	244.842	193.929
43	DC Generation A/S	DTU Kraftvarmeværk	24.430	21.862	19.368	16.952	14.612	12.348	10.157	8.045
44	Helsingør Kraftvarmeværk A/S	Helsingør Kraftvarmeværk	34.062	30.482	27.003	23.635	20.373	17.216	14.162	11.217
45	Hillerød Kraftvarme ApS	Hillerød Kraftvarmeværk	60.042	53.732	47.601	41.664	35.913	30.349	24.965	19.774

Instal-lation ID (Union registry)	Operator	Installation	Preliminary allocation							
			2013	2014	2015	2016	2017	2018	2019	2020
47	DONG Energy Thermal Power A/S	Kyndbyværket	9.249	8.276	7.333	6.418	5.532	4.675	3.846	3.046
48	DONG Energy Thermal Power A/S	Asnæsværket	135.778	123.151	111.718	101.448	92.290	84.197	78.601	73.799
49	DONG Energy Thermal Power A/S	Stigsnæsværket	7.417	6.637	5.880	5.147	4.436	3.749	3.084	2.442
52	HOFOR Energiproduktion A/S	Amagerværket	399.799	332.123	271.497	217.737	170.536	133.551	109.857	87.014
53	DONG Energy Thermal Power A/S	H.C. Ørsted Værket	249.919	223.654	198.133	173.421	149.485	126.325	103.912	82.305
54	DONG Energy Thermal Power A/S	Svanemølleværket	166.829	149.295	132.260	115.764	99.785	84.326	69.364	54.941
55	Ringsted Kraftvarmeværk A/S	Ringsted Kraftvarmeværk	5.206	4.659	4.127	3.613	3.114	2.631	2.165	1.714
56	Vestegnens Kraftvarmeselskab I/S	Køge Kraftvarmeværk	17.230	15.419	13.660	11.956	10.305	8.709	7.164	5.674
58	Løgstør Fjernvarmeværk AMBA	Løgstør Fjernvarmeværk	12.526	11.210	9.930	8.691	7.492	6.331	5.208	4.125
59	Sakskøbing Fjernvarmeselskab A.m.b.a.	Sakskøbing Fjernvarme	33	30	26	23	20	16	13	11
60	Fjernvarme Fyn A/S	Otterup Varmecentral	402	359	318	279	240	203	167	132
61	E.ON Produktion Danmark A/S	Frederikssund Kraftvarmeværk	14.071	12.592	11.156	9.764	8.416	7.112	5.851	4.634
62	Danmarks Tekniske Universitet	DTU Kedelcentral	2.675	2.395	2.121	1.856	1.599	1.350	1.109	877
64	Smørum Kraftvarme AMBA	Smørum Kraftvarme	9.228	8.258	7.316	6.403	5.519	4.665	3.837	3.039
65	Svendborg Fjernvarme A.M.B.A	Svendborg Fjernvarme, Central Bagergade	6.563	5.874	5.203	4.552	3.922	3.312	2.721	2.152
66	Svendborg Fjernvarme A.M.B.A	Svendborg Fjernvarme, Vestre Central	2.592	2.321	2.055	1.799	1.549	1.308	1.075	850
68	Silkeborg Varme A/S	Silkeborg Varme A/S - Kraftvarmeværket	68.781	61.552	54.529	47.727	41.139	34.766	28.597	22.651
69	Vattenfall A/S	Vattenfall A/S Fynsværket	488.806	411.007	340.776	295.608	255.324	216.345	178.621	142.249
70	VERDO Produktion A/S	Grenå Kraftvarmeværk	40.435	37.556	34.751	32.027	29.379	26.808	24.312	21.896
71	DONG Energy Thermal Power A/S	Studstrupværket	717.776	588.831	474.241	373.598	293.969	248.423	204.348	161.857
72	DONG Energy Thermal Power A/S	Skærbækværket	211.846	181.413	160.713	140.668	121.252	102.466	84.287	66.760
73	DONG Energy Thermal Power A/S	Herningværket	119.197	106.669	94.498	82.712	71.296	60.249	49.560	39.255
74	Ringkøbing Fjernvarmeværk AMBA	Ringkøbing Værket	11.567	10.352	9.170	8.027	6.918	5.847	4.809	3.810
75	Skjern Fjernvarmecentral A.m.b.a.	Skjern Fjernvarmecentral afd. Øst	8.281	7.411	6.565	5.747	4.953	4.185	3.443	2.727
76	DONG Energy Thermal Power A/S	Enstedværket	79.390	65.431	52.992	42.027	32.900	27.803	22.870	18.115
77	Frederikshavn Varme	Frederikshavn Kraftvarmeværk	19.348	17.314	15.339	13.426	11.572	9.780	8.044	6.372
78	Vattenfall A/S	Vattenfall A/S Nordjyllandsværket	335.507	277.319	225.365	179.479	140.207	118.484	97.463	77.196
79	Hirtshals Fjernvarme AMBA	Hirtshals Kraftvarmeværk	8.569	7.668	6.793	5.946	5.126	4.331	3.563	2.822
80	DONG Energy Thermal Power A/S	Esbjergværket	189.575	156.770	127.471	101.583	84.059	71.035	58.432	46.282
81	VERDO Produktion A/S	Verdo Produktion - Kulholmsvej	108.500	97.097	86.018	75.289	64.897	54.842	45.112	35.732
82	VERDO Produktion A/S	Verdo Produktion - Ydervangen	569	509	451	395	340	287	236	187
83	VERDO Produktion A/S	Verdo Produktion - Katholmvej	51	46	41	36	31	26	21	16
84	VERDO Produktion A/S	Verdo Produktion - Bronzevej	314	281	248	218	187	158	130	103
85	Måbjergværket A/S	Måbjergværket A/S	82.738	74.042	65.594	57.412	49.488	41.821	34.401	27.248
86	HKV Horsens A/S	HKV Horsens A/S - Horsens Kraftvarmeværk	47.814	42.788	37.906	33.179	28.599	24.168	19.880	15.746
87	Gev Varme A/S	KVV Grønningen/Central 2	7.654	6.850	6.068	5.311	4.578	3.869	3.183	2.520
88	Gev Varme A/S	KVV Tårnvej	11.885	10.636	9.422	8.247	7.108	6.008	4.942	3.914
91	Østkraft Produktion A/S	Østkraft	30.026	24.974	20.443	16.422	13.941	11.780	9.690	7.675
92	Energigruppen Jylland Varme A/S	EnergiGruppen Jylland, Holstebrovej	5.440	4.869	4.312	3.773	3.250	2.745	2.255	1.784
93	Energigruppen Jylland Varme A/S	EnergiGruppen Jylland, Nord varmecentral	2.589	2.317	2.052	1.796	1.547	1.306	1.073	849
94	Energigruppen Jylland Varme A/S	EnergiGruppen Jylland, Vest	221	197	176	154	132	112	92	73
95	Vestforsyning Varme A/S	Vestforsyning Varme A/S, Central H	1.899	1.699	1.505	1.316	1.134	958	787	622
96	Vestforsyning Varme A/S	Vestforsyning Varme A/S, Central Nord	413	370	328	287	247	209	172	135
97	Vestforsyning Varme A/S	Vestforsyning Varme A/S, Central Ellebæk	1.654	1.479	1.310	1.147	987	834	685	542

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			2013	2014	2015	2016	2017	2018	2019	2020
98	Vestforsyning Varme A/S	Vestforsyning Varme A/S, Central Vest	1.823	1.632	1.446	1.265	1.090	920	756	598
99	Vestforsyning Varme A/S	Vestforsyning Varme A/S, Central Øst	2.878	2.575	2.281	1.996	1.720	1.452	1.193	944
100	FFV Varme A/S	FFV Varme A/S	9.479	8.483	7.515	6.578	5.670	4.791	3.942	3.122
101	Vojens Fjernvarme A.M.B.A.	Vojens Fjernvarme Sdr. Ringvej	7.738	6.925	6.135	5.369	4.629	3.911	3.218	2.549
102	Albertslund Kommunale Fjernvarme	Albertslund Varmeværk	1.712	1.532	1.357	1.188	1.022	863	710	561
103	Thisted Varmeforsyning AMBA	Thisted Varmeforsyning - Ringvej	305	273	241	211	182	154	127	100
104	Vinderup Varmeværk A M B A	Vinderup Varmeværk	6.319	5.655	5.009	4.385	3.779	3.194	2.628	2.081
105	Videbæk Varme A/S C/O Videbæk Energiforsyning AMBA	Videbæk Varme A/S, Godthåbsvej	918	822	728	637	548	463	380	301
106	Videbæk Varme A/S C/O Videbæk Energiforsyning AMBA	Videbæk Varme A/S, Kraftvarmeværk	7.642	6.839	6.059	5.303	4.571	3.863	3.178	2.517
108	Tranbjerg Varmeværk A M B A	Tranbjerg Varmeværk	104	93	82	71	61	52	43	34
109	Skagen Varmeværk AMBA	Skagen Varmeværk	3.826	3.424	3.032	2.653	2.286	1.930	1.586	1.255
110	Skagen Varmeværk AMBA	Skagen Kraftvarmeværk	6.838	6.119	5.421	4.745	4.090	3.456	2.843	2.252
111	Hjallerup Fjernvarmeværk	Hjallerup Fjernvarmeselskab	6.945	6.215	5.506	4.819	4.154	3.510	2.887	2.287
112	Fjernvarme Fyn A/S	Bellinge Varmecentral	202	181	160	140	121	102	84	66
113	Fjernvarme Fyn A/S	Billedskærervej Varmecentral	1.837	1.644	1.457	1.274	1.098	927	762	603
114	Fjernvarme Fyn A/S	Bolbro Varmecentral	756	676	599	524	451	381	313	248
115	Fjernvarme Fyn A/S	Centrum Varmecentral	2.615	2.341	2.073	1.814	1.563	1.319	1.084	857
116	Fjernvarme Fyn A/S	Dyrup Varmecentral	444	397	352	308	265	224	184	146
117	Fjernvarme Fyn A/S	Dalum Varmecentral	506	453	401	351	302	255	210	166
118	Fjernvarme Fyn A/S	Korup Varmecentral	606	543	480	421	362	306	252	199
119	Fjernvarme Fyn A/S	Næsby Varmecentral	488	436	387	338	292	247	202	160
120	Fjernvarme Fyn A/S	Pårup Varmecentral	803	719	637	557	480	405	333	264
121	Fjernvarme Fyn A/S	Sanderum Varmecentral	494	442	391	343	295	249	205	162
122	Fjernvarme Fyn A/S	Sydøst Varmecentral	545	487	431	378	325	275	226	179
123	Fjernvarme Fyn A/S	Vollsmose Varmecentral	1.129	1.011	895	783	675	570	468	370
124	Fredericia Fjernvarme A.M.B.A.	Fredericia Fjernvarme	531	475	421	368	317	268	220	174
125	Fredericia Fjernvarme A.M.B.A.	Fredericia Fjernvarme	769	688	610	533	460	388	319	252
126	Sønderborg Fjernvarme AMBA	Sønderborg Fjernvarme, Sundquist	203	182	161	141	121	102	84	67
127	Sønderborg Fjernvarme AMBA	Sønderborg Fjernvarme, Rojum	3.218	2.879	2.550	2.232	1.922	1.623	1.333	1.055
128	Varde Varmeforsyning A/S	Varmecentral Søndermarken	536	480	425	372	321	271	222	176
129	Varde Varmeforsyning A/S	Varmecentral Toften	1.503	1.344	1.191	1.042	897	758	623	493
130	Aabenraa-Rødekro Fjernvarme AMBA	Aabenraa-Rødekro Fjernvarme - Humlehaven Central	352	315	278	244	210	177	146	115
131	Aabenraa-Rødekro Fjernvarme AMBA	Aabenraa-Rødekro Fjernvarme - Rådmandsløkken central	244	219	194	170	146	123	101	80
132	Aabenraa-Rødekro Fjernvarme AMBA	Aabenraa-Rødekro Fjernvarme - Skovgård central	172	154	136	120	103	87	72	56
133	Aabenraa-Rødekro Fjernvarme AMBA	Aabenraa-Rødekro Fjernvarme - Rødekro central	395	354	313	274	236	199	164	129
134	Tønder Fjernvarmeselskab AMBA	Tønder Fjernvarmeselskab Amba	1.386	1.239	1.098	961	828	699	574	454
135	Lemvig Varmeværk AMBA	Lemvig Varmeværk	15.884	14.214	12.593	11.022	9.500	8.029	6.604	5.231
137	Billund Varmeværk A.M.B.A.	Billund Varmeværk II	10.263	9.184	8.137	7.122	6.139	5.188	4.268	3.380
138	Ringkøbing Fjernvarmeværk AMBA	Rindum Værket	10.851	9.711	8.603	7.529	6.490	5.484	4.512	3.573
139	Vildbjerg Varmeværk A.m.b.a.	Vildbjerg Varmeværk Amba	7.845	7.021	6.220	5.443	4.692	3.965	3.262	2.584
140	Brovst Fjernvarme Andelsselskab	Brovst Fjernvarme	6.204	5.552	4.919	4.305	3.710	3.136	2.579	2.044
141	Skanderborg-Hørning Fjernvarme	Skanderborg-Hørning Fjernvarme	2.212	1.979	1.753	1.533	1.321	1.116	917	725
142	Esbjerg Varme A/S	Hedelund Varmeværk	866	775	687	601	518	437	359	284
143	Esbjerg Varme A/S	Hjerting Varmeværk	109	98	86	76	66	55	45	36

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144	Esbjerg Varme A/S	Gjesing Varmecentral	1.416	1.267	1.123	982	846	715	587	464
145	Esbjerg Varme A/S	Sædding Varmeværk	1.775	1.589	1.407	1.232	1.061	896	736	582
149	Hedensted Fjernvarme	Hedensted Fjernvarme	7.849	7.024	6.223	5.446	4.695	3.967	3.264	2.585
150	Dagnæs-Bækkelund Varmeværk	Dagnæs-Bækkelund Varmeværk	266	237	210	184	159	134	110	87
151	Roskilde Varme A/S	Roskilde Varme A/S, Hovedcentralen	4.395	3.933	3.484	3.048	2.626	2.217	1.822	1.441
152	Roskilde Varme A/S	Roskilde Varme A/S, Central Lillevang	1.645	1.472	1.304	1.140	983	830	682	539
153	Gråsten Varme A/S	Gråsten Varme A/S	6.182	5.532	4.900	4.290	3.697	3.124	2.570	2.036
154	Grenå Fjernvarme A M B A	Grenå Varmeværk	150	134	119	104	89	76	62	49
155	Grenå Fjernvarme A M B A	Grenå Varmeværk AMBA - Bredstrup Varmeværk	220	196	174	152	131	111	91	72
156	Andelsselskabet Mølholm Varmeværk	Mølholm Varmeværk	370	331	293	256	221	186	153	121
157	Greve Fjernvarme A.m.b.a.	Hundige Fjernvarmeværk	280	250	222	194	167	141	116	92
158	Jyderup Varme A/S	Jyderup Varmeværk	5.822	5.211	4.616	4.040	3.482	2.943	2.421	1.917
159	Hillerød Varme A/S	Frederiksgade Varmecentral	5.285	4.730	4.190	3.666	3.158	2.666	2.191	1.733
160	Hillerød Varme A/S	Ullerød Varmecentral	1.548	1.385	1.226	1.073	924	781	641	508
161	Hillerød Varme A/S	Kgs. Vænge Varmecentral	1.580	1.414	1.253	1.096	944	797	655	519
162	Hillerød Varme A/S	Elmegaarden Varmecentral	3.536	3.164	2.803	2.452	2.113	1.784	1.465	1.160
163	Ikast Værkerne Varme A/S	Ikast El- og Varmeværk	3.637	3.255	2.883	2.523	2.173	1.835	1.508	1.193
164	Nykøbing Sj Varmeværk	Nykøbing S. Varmeværk	8.729	7.812	6.920	6.057	5.221	4.412	3.629	2.874
165	Kerteminde Forsyning - Varme A/S	Kerteminde Fjernvarme	140	126	111	97	84	70	58	46
167	Brønderslev varme A/S	Brønderslev Varme A/S - Brønderslev Kraftvarme	22.932	20.522	18.181	15.913	13.716	11.591	9.535	7.553
168	Svendborg Fjernvarme A.M.B.A	Svendborg Fjernvarme, Nordre Central	7.525	6.734	5.966	5.221	4.501	3.804	3.128	2.478
169	AffaldVarme Århus, Århus Kommune, Teknik & Miljø	AffaldVarme Århus, Århusværket	769	688	610	533	460	388	319	252
170	AffaldVarme Århus, Århus Kommune, Teknik & Miljø	AffaldVarme Århus, Risskov Varmecentral	255	229	203	178	152	129	106	84
171	AffaldVarme Århus, Århus Kommune, Teknik & Miljø	AffaldVarme Aarhus, Jens Juuls Vej, Kedelanlæg 793	3.079	2.755	2.440	2.135	1.839	1.553	1.276	1.010
172	AffaldVarme Århus, Århus Kommune, Teknik & Miljø	AffaldVarme Århus, Viby Varmecentral	307	275	244	213	184	155	128	101
173	AffaldVarme Århus, Århus Kommune, Teknik & Miljø	AffaldVarme Århus, Gellerup	1.390	1.243	1.101	964	830	701	576	456
174	Vamdrup Fjernvarme I M B A	Vamdrup Fjernvarme	4.962	4.441	3.934	3.443	2.968	2.508	2.063	1.634
175	Ribe Fjernvarme AMBA	Ribe Fjernvarmecentral	1.119	1.001	887	776	668	564	464	367
176	Ribe Fjernvarme AMBA	Ribe Kraftvarmeværk	11.011	9.854	8.729	7.641	6.586	5.566	4.578	3.626
177	Nykøbing M Fjernvarmeværk A M B A	Nykøbing Mors Fjernvarmeværk	9.142	8.181	7.248	6.344	5.468	4.621	3.801	3.010
178	Haderslev Fjernvarme AMBA	Haderslev Fjernvarme	4.968	4.446	3.938	3.445	2.968	2.506	2.059	1.629
179	Haderslev Fjernvarme AMBA	Haderslev Fjernvarme	4.952	4.432	3.925	3.436	2.962	2.503	2.059	1.631
180	Brande Fjernvarme A.m.b.a	Brande Fjernvarme A.m.b.a.	7.119	6.371	5.644	4.940	4.258	3.598	2.960	2.345
183	Sindal Varmeforsyning AMBA	Sindal Varmeforsyning	6.426	5.751	5.094	4.459	3.843	3.248	2.672	2.116
184	Kjellerup Fjernvarme Amba	Kjellerup Fjernvarme	9.051	8.100	7.175	6.277	5.407	4.566	3.752	2.968
186	Bramming Fjernvarme AMBA	Bramming Fjernvarme A.m.b.a.	13.521	12.100	10.720	9.382	8.087	6.834	5.622	4.452
187	Toftlund Fjernvarme A.M.B.A	Toftlund Fjernvarmecentral	5.253	4.701	4.165	3.645	3.142	2.655	2.184	1.730
188	Sæby Varmeværk AMBA	Sæby Varmeværk	15.359	13.745	12.177	10.658	9.187	7.763	6.387	5.058
190	Forsyning Helsingør Varme A/S	Central Vest	7.480	6.694	5.928	5.187	4.468	3.773	3.100	2.453
191	Forsyning Helsingør Varme A/S	Central Mads Holmsvej	3.799	3.400	3.011	2.634	2.270	1.917	1.575	1.246
193	Hjørring Varmeforsyning AMBA	Hjørring Varmeforsyning	21.829	19.535	17.306	15.147	13.056	11.034	9.076	7.189
194	Hjørring Varmeforsyning AMBA	Hjørring Varmeforsyning	5.378	4.813	4.263	3.730	3.213	2.713	2.229	1.763
195	Vrå Varmeværk AMBA	Vrå Varmeværk	5.329	4.769	4.225	3.697	3.188	2.693	2.216	1.755
197	Horsens Varmeværk A M B A	Horsens Varmeværk, Hovedcentral	4.377	3.918	3.470	3.035	2.615	2.209	1.815	1.435

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198	Horsens Varmeværk A M B A	Horsens Varmeværk, Central Øst	33	30	26	23	20	16	13	11
200	Kerteminde Forsyning - Varme A/S	Langeskov Fjernvarme	206	184	163	143	123	104	85	68
201	Vejle Fjernvarme A.m.b.a.	Vejle Fjernvarme a.m.b.a., Central Langelinie	1.623	1.453	1.287	1.126	970	820	673	533
202	I/S Skive Fjernvarme	I/S Skive Fjernvarme	12.478	11.166	9.892	8.658	7.464	6.307	5.188	4.109
205	SK-Varme A/S	SK-Varme A/S - Sdr. Stationsvej	1.139	1.019	903	789	681	575	472	373
206	Vestegnens Kraftvarmeselskab I/S	VEKS - Solrød Kedelcentral	798	715	633	554	477	403	331	262
207	Hvide Sande Fjernvarme A.M.B.A.	Hvide Sande Fjernvarme	8.273	7.403	6.559	5.741	4.948	4.182	3.440	2.724
208	Næstved Varmeværk	Næstved Varmeværk	114	102	90	79	68	58	47	37
209	Næstved Varmeværk	Næstved Varmeværk	474	424	376	329	283	240	197	156
211	Vordingborg Fjernvarme A/S	Bødkervænget Varmecentral	919	823	729	638	549	464	381	302
212	Centralkommunernes Transmissionsselskab I/S	CTR, Nybrovej Centralen	1.089	975	863	756	651	550	451	357
213	Centralkommunernes Transmissionsselskab I/S	CTR, Spidslastcentral Phistersvej	1.521	1.361	1.205	1.055	909	767	630	499
215	Centralkommunernes Transmissionsselskab I/S	Frederiksberg Varmecentral	13.257	11.864	10.509	9.194	7.920	6.688	5.495	4.347
216	Centralkommunernes Transmissionsselskab I/S	Høje Gladsaxe Varmecentral	2.411	2.157	1.911	1.672	1.440	1.216	999	791
217	Centralkommunernes Transmissionsselskab I/S	Gladsaxe Spidslastanlæg	1.826	1.634	1.447	1.266	1.091	921	757	599
218	Centralkommunernes Transmissionsselskab I/S	CTR, Utterslev Varmecentral	614	549	487	426	367	310	254	201
219	I/S AffaldPlus	Næstved Kraftvarmeværk	40.108	35.892	31.798	27.831	23.989	20.273	16.676	13.209
221	Lystrup Fjernvarme A.m.b.a.	Lystrup Fjernvarme Amba	102	91	81	71	60	52	42	34
222	Guldborgsund Varme A/S	Guldborgsund Varme Fjernvarmecentral Nord	375	335	297	260	224	189	156	123
223	Guldborgsund Varme A/S	Guldborgsund Varme Fjernvarmecentral Øst	2.199	1.968	1.743	1.525	1.314	1.109	912	721
224	Holme-Lundshøj Fjernvarme A.m.b.a	Holme Lundshøj Fjernvarme amba	62	56	49	43	37	31	25	21
225	Gram Fjernvarme AMBA	Gram Fjernvarme	5.075	4.542	4.024	3.522	3.036	2.566	2.110	1.671
227	Odder Varmeværk AMBA	Odder Varmeværk	251	225	199	174	150	126	104	82
228	Svogerslev Fjernvarmecentral A.m.b.a.	Svogerslev Fjernvarmecentral	248	222	197	172	148	125	103	82
229	Høje Taastrup Fjernvarme A.m.b.a.	Høje Taastrup Fjernvarme - Gasværksvej-centralen	64	57	51	45	39	33	27	21
230	Avedøre Fjernvarme A.m.b.a	Avedøre Fjernvarme A.m.b.a	293	262	233	204	175	148	121	96
231	Frederikshavn Varme	Varmecentral Niels Juelsvej	10.829	9.691	8.584	7.510	6.470	5.463	4.489	3.551
232	Frederikshavn Varme	Varmecentral Ærøvej	5.986	5.357	4.745	4.152	3.576	3.020	2.481	1.963
233	FD Hvidovre Amba	Hvidovre varmecentral	58	51	45	40	34	29	24	19
234	Bogense Forsyningsselskab A.m.b.a	Bogense Forsyningsselskab	7.061	6.319	5.598	4.899	4.223	3.569	2.936	2.325
235	Brøndby Fjernvarme A.m.b.a.	Brøndbyøster Fjernvarmecentral	626	560	496	434	374	316	259	205
236	Brøndby Fjernvarme A.m.b.a.	Brøndbyvester Fjernvarmecentral	930	832	737	645	555	469	386	305
237	Middelfart Fjernvarme a.m.b.a	Middelfart Fjernvarme, Hovedcentral	1.193	1.068	946	828	713	602	495	392
240	Rønne Varme A/S	Rønne Varme A/S, reserve og spidslastcentral	70	63	55	48	42	35	29	23
241	I/S Vestforbrænding	I/S Vestforbrænding	203.756	182.342	161.536	141.388	121.873	102.990	84.718	67.102
242	I/S Vestforbrænding	Hedegårdens varmecentral (I/S Vestforbrænding)	535	479	424	371	320	270	221	176
243	Fjernvarmecentralen Avedøre Holme	Fjernvarmecentralen Avedøre Holme	1.828	1.636	1.449	1.268	1.093	923	758	599
244	Colas A/S	Colas, Glostrup	1.534	1.372	1.215	1.064	917	774	635	503
247	Colas A/S	Colas, Vinderup	991	888	786	688	592	500	411	326
248	NLMK Dansteel A/S	NLMK DanSteel	70.758	69.529	68.285	67.029	65.759	64.476	63.178	61.876
249	DONG Naturgas A/S	DONG Naturgas - Nybro Gasbehandlingsanlæg	11.986	10.726	9.503	8.317	7.169	6.059	4.983	3.947
250	Grundejerforeningen Smørmosen	Grundejerforeningen Smørmosens Kraftvarmeværk	13.838	13.597	13.356	13.116	12.875	12.634	12.393	12.153
251	E.ON Produktion Danmark A/S	Glostrup Hospital	2.784	2.492	2.207	1.932	1.665	1.407	1.157	917
252	NCC Roads A/S	NCC Roads A/S, asfalt, Odense	1.681	1.504	1.333	1.166	1.004	848	697	552

Instal-lation ID (Union registry)	Operator	Installation	Preliminary allocation							
			2013	2014	2015	2016	2017	2018	2019	2020
254	NCC Roads A/S	NCC Roads A/S, asfalt, Herlev	2.083	1.863	1.651	1.444	1.244	1.050	863	683
255	NCC Roads A/S	NCC Roads A/S, asfalt, Ejby	2.273	2.034	1.802	1.576	1.358	1.147	942	746
257	NCC Roads A/S	NCC Roads Trige	1.878	1.680	1.488	1.302	1.123	948	778	616
258	Nybro Tørreri Amba	Nybro Tørreri	6.663	5.963	5.282	4.621	3.981	3.361	2.762	2.185
260	A/S Knud Jepsen	Knud Jepsen A/S	5.936	5.313	4.705	4.119	3.551	3.000	2.469	1.955
261	Alfred Pedersen & Søn Bellinge ApS	Alfred Pedersen og Søn	9.230	8.261	7.318	6.405	5.521	4.665	3.838	3.039
262	Gartneriet Kronborg ApS	Kronborg Aps.	3.255	2.913	2.581	2.259	1.947	1.645	1.353	1.072
263	Gartneriet Masnedø A/S	Masnedø Gartnerier A/S	7.982	7.143	6.328	5.539	4.774	4.035	3.318	2.628
264	Østervang Sjælland A/S	Østervang Sjælland A/S	9.323	8.343	7.392	6.470	5.577	4.713	3.876	3.070
265	Akzo Nobel Salt A/S	Akzo Nobel Salt A/S	58.308	57.296	56.271	55.236	54.189	53.133	52.063	50.989
266	Damolin A/S	Damolin Fur A/S	5.409	5.316	5.220	5.124	5.027	4.930	4.829	4.730
267	Damolin A/S	Damolin Mors A/S	24.401	23.976	23.548	23.115	22.677	22.234	21.787	21.337
268	Danish Crown A/S	Danish Crown Ringsted	7.825	7.003	6.203	5.427	4.674	3.947	3.244	2.566
269	Danish Crown A/S	Danish Crown Horsens	12.570	11.250	9.963	8.718	7.510	6.341	5.210	4.123
270	Daka Denmark A/S	Daka Denmark A/S	21.650	19.377	17.162	15.015	12.936	10.922	8.975	7.100
272	Daka Denmark A/S	Daka Bio-industries Randers	26.924	24.095	21.343	18.674	16.087	13.582	11.161	8.829
273	Tulip Food Company A/S	Tulip Food Company Vejle	5.069	4.536	4.018	3.515	3.029	2.557	2.101	1.662
274	Fiskernes Fiskeindustri AMBA	Fiskernes Fiskeindustri	47.937	47.105	46.262	45.411	44.551	43.682	42.802	41.920
275	Hanstholms Fiskemelsfabrik A/S	Hanstholms Fiskemelsfabrik A/S	15.028	14.617	14.207	13.800	13.396	12.995	12.596	12.202
276	Triplenine A/S	TripleNine Fish Protein Thyborøn	31.275	30.732	30.182	29.626	29.065	28.498	27.925	27.349
277	Triplenine A/S	Triplenine Fish Protein, Esbjerg	28.619	27.928	27.239	26.552	25.866	25.183	24.499	23.822
278	AarhusKarlshamn Denmark A/S	AarhusKarlshamn Denmark A/S	60.483	57.218	54.016	50.888	47.830	44.843	41.925	39.089
279	Arla Foods Energy A/S	Arla Foods Energy A/S. Afd AKAFA	30.430	29.901	29.371	28.842	28.312	27.783	27.253	26.724
280	Arla Foods Energy A/S	Arla Foods Energy A/S. Afd. Danmark Protein A/S	26.938	26.470	25.997	25.519	25.035	24.547	24.053	23.557
281	Arla Foods Energy A/S	Arla Foods Energy A/S, Arinco Afdeling	35.318	34.703	34.089	33.474	32.860	32.245	31.631	31.016
282	Arla Foods Energy A/S	Arla Foods Energy A/S, Afd. HOCO	27.710	27.229	26.742	26.250	25.753	25.251	24.742	24.232
284	Dangrønt Products A/S	Dangrønt Ribe	5.940	5.316	4.709	4.121	3.549	2.997	2.462	1.948
285	Dangrønt Products A/S	Dangrønt Ringkøbing	6.158	5.511	4.881	4.271	3.679	3.106	2.552	2.020
287	Nordic Sugar A/S	Nordic Sugar, Nykøbing Sukkerfabrik	66.754	65.595	64.422	63.236	62.039	60.829	59.604	58.375
288	Nordic Sugar A/S	Nordic Sugar, Nakskov Sukkerfabrik	77.052	75.713	74.360	72.992	71.607	70.212	68.797	67.379
291	CP Kelco ApS	CP Kelco ApS	71.913	70.664	69.400	68.123	66.832	65.529	64.210	62.886
293	Carlsberg Danmark A/S	Carlsberg Danmark A/S - Vesterfælledvej	10.790	9.657	8.554	7.484	6.447	5.444	4.473	3.538
294	Carlsberg Danmark A/S	Carlsberg Danmark A/S - Vestre Ringvej	18.518	16.572	14.678	12.843	11.064	9.342	7.676	6.072
295	Danish Malting Group A/S	Danish Malting Group	16.255	15.972	15.690	15.406	15.124	14.841	14.558	14.275
296	Sophus Fuglsang. Export-Maltfabrik A/S	Dragsbæk Maltfabrik	16.776	16.484	16.192	15.900	15.608	15.316	15.025	14.733
297	Harboes bryggeri A/S	Harboes Bryggeri A/S	4.255	3.808	3.373	2.952	2.543	2.147	1.764	1.396
300	Novopan Træindustri A/S	Novopan Træindustri A/S	46.127	45.326	44.516	43.696	42.869	42.033	41.186	40.337
301	Dalum Papir A/S	Dalum Papir A/S	79.789	75.838	71.957	68.159	64.440	60.803	57.244	53.779
304	Skjern Papirfabrik A/S	Skjern Papirfabrik A/S	15.999	15.634	15.268	14.904	14.539	14.175	13.811	13.449
305	Brødrene Hartmann A/S	Brødrene Hartmann A/S	42.682	38.277	33.990	29.833	25.805	21.904	18.129	14.497
306	A/S Dansk Shell	Shell Raffinaderiet Fredericia	402.124	388.977	375.959	363.101	350.393	337.846	325.435	313.240
307	Statoil Refining Denmark A/S	Statoil Raffinaderiet	481.607	473.242	464.779	456.227	447.583	438.855	430.019	421.151
308	Sun chemical a/s	Sun Chemical A/S	11.655	11.452	11.248	11.041	10.831	10.620	10.406	10.192
309	Novozymes A/S	Novozymes A/S	11.599	11.398	11.194	10.988	10.780	10.570	10.357	10.143

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			2013	2014	2015	2016	2017	2018	2019	2020
311	Cheminova A/S	Cheminova A/S	54.403	53.456	52.510	51.563	50.616	49.670	48.724	47.777
313	Novo Nordisk a/s	Novo Nordisk A/S	3.954	3.885	3.816	3.745	3.674	3.603	3.530	3.457
314	Haldor Topsøe A/S	Haldor Topsøe A/S	28.126	27.637	27.143	26.644	26.139	25.629	25.113	24.595
315	Roulunds Energy ApS	Roulunds Energy ApS	4.195	3.754	3.325	2.910	2.507	2.116	1.739	1.376
317	Ardagh Glass Holmegaard A/S	Ardagh Glass Holmegaard A/S	51.491	50.555	49.610	48.658	47.697	46.728	45.749	44.770
318	Saint-Gobain Isover A/S	Saint Gobain Isover A/S	10.270	10.092	9.911	9.728	9.545	9.358	9.170	8.981
320	A/S Carl Matzens Teglværker	Carl Matzens Teglværk A/S	3.892	3.825	3.756	3.687	3.618	3.547	3.476	3.404
321	A/S Gråsten Teglværk	Gråsten Teglværk	6.621	6.506	6.389	6.272	6.153	6.033	5.912	5.790
322	Helligsø Teglværk A/S	Helligsø Teglværk A/S	5.240	5.149	5.057	4.964	4.869	4.775	4.678	4.582
323	Højslev Teglværk A/S	Højslev Tegl A/S	4.007	3.938	3.868	3.797	3.725	3.652	3.578	3.504
324	Monier A/S	Monier A/S	4.217	4.144	4.070	3.994	3.919	3.843	3.766	3.687
325	Lundgaard Teglværk A/S	LUNDGÅRD TEGLVÆRK A/S	6.772	6.654	6.535	6.415	6.293	6.170	6.046	5.922
328	Petersen Tegl Egernsund A/S	PETERSEN TEGL EGERNSUND A/S	6.009	5.905	5.799	5.692	5.584	5.475	5.365	5.254
329	Wienerberger A/S	Wienerberger A/S - Petersminde Teglværk	6.479	6.367	6.253	6.138	6.022	5.904	5.785	5.666
330	Pipers Teglværker A/S	Pipers Teglværker A/S Gandrup Teglværk	14.610	14.357	14.100	13.840	13.578	13.313	13.045	12.776
331	Pipers Teglværker A/S	PIPERS TEGLVÆRKER A/S Hammershøj Teglværk	16.283	16.000	15.714	15.425	15.133	14.838	14.539	14.239
333	Tychsens Teglværk A/S	Tychsen's Teglværk A/S	5.146	5.057	4.966	4.875	4.783	4.689	4.595	4.500
334	Vedstaarup Teglværk A/S	Vedstaarup Teglværk A/S	13.271	13.040	12.807	12.572	12.333	12.092	11.849	11.605
336	Vesterled Teglværk A/S	Vesterled Teglværk A/S	11.021	10.830	10.636	10.441	10.243	10.043	9.841	9.638
337	Villemoes Teglværk A/S	Villemoes Teglværk	2.480	2.437	2.394	2.349	2.305	2.260	2.215	2.169
338	Pipers Teglværker A/S	Vindø Teglværk	5.727	5.628	5.527	5.425	5.322	5.219	5.114	5.008
339	Wienerberger A/S	Pedershvile Teglværk	6.148	6.042	5.934	5.824	5.714	5.603	5.490	5.377
342	Aalborg Portland A/S	Aalborg Portland A/S	2.094.007	2.051.548	2.008.872	1.966.040	1.923.034	1.879.891	1.836.497	1.793.211
343	Faxe Kalkbrud A/S	Faxe Kalk, Ovnanlægget Stubberup	54.021	52.923	51.820	50.713	49.602	48.488	47.366	46.247
344	Knauf Danogips A/S	Knauf Danogips	20.029	17.925	15.876	13.891	11.968	10.105	8.302	6.568
345	Gyproc A/S	Gyproc A/S	12.326	11.029	9.770	8.548	7.363	6.218	5.109	4.041
348	Munck Asfalt A/S	Munck Asfalt A/S, Aarup	1.242	1.111	984	861	741	626	515	408
349	Munck Asfalt A/S	Munck Asfalt A/S, Roskilde	1.424	1.275	1.129	988	852	719	591	467
350	Munck Asfalt A/S	Munck Asfalt A/S, Ans By	1.525	1.365	1.208	1.058	912	770	632	501
351	Rockwool A/S	Rockwool A/S Doense	49.096	48.123	47.143	46.161	45.173	44.180	43.182	42.183
353	Rockwool A/S	Rockwool A/S, Vamdrup	51.634	50.527	49.418	48.305	47.193	46.077	44.958	43.845
354	Saint-Gobain Weber A/S	Saint-Gobain Weber, Hinge	55.087	54.130	53.162	52.184	51.195	50.197	49.186	48.172
356	Danfoss A/S	Danfoss	19.020	18.690	18.355	18.018	17.677	17.332	16.983	16.633
359	Fællinggaard Varmeforsyning ApS	Fællinggaard Varmeforsyning Aps	7.306	6.538	5.792	5.070	4.370	3.693	3.038	2.406
360	DuPont Nutrition Biosciences ApS	DuPont Nutrition Biosciences, Grindsted	26.485	26.024	25.559	25.089	24.614	24.134	23.648	23.160
361	Duferco Danish Steel A/S	Duferco Danish Steel	10.651	10.466	10.279	10.090	9.898	9.705	9.510	9.314
362	Fjernvarme Fyn A/S	Sygehusets Varmecentral	1.009	902	800	699	603	509	418	331
363	Arkil A/S	Arkil asfalt	1.407	1.260	1.116	976	840	710	583	462
364	Lemminkäinen A/S	Lemminkäinen A/S Randers Asfaltfabrik	831	743	658	576	496	419	344	272
367	Region Hovedstaden	Gentofte Hospital	1.232	1.103	977	855	736	622	511	404
369	Region Hovedstaden	Hvidovre Hospital	2.124	1.901	1.683	1.473	1.269	1.071	880	697
370	Mærsk Olie og Gas A/S	Dan feltet omfattende anlæg på platformene Dan A, -B, -C, -D, -E, -FA, -FB, -FC, -FD, -FE, -FF og -F	446.919	439.156	431.302	423.367	415.345	407.246	399.046	390.817
371	Mærsk Olie og Gas A/S	Gorm feltet omfattende anlæg på platformene Gorm A, -B, -C, -D, -E og F	322.053	316.460	310.800	305.082	299.301	293.465	287.556	281.626
372	Mærsk Olie og Gas A/S	Harald feltet omfattende anlæg på platformene Harald A og -B	6.188	6.081	5.972	5.862	5.751	5.639	5.525	5.411

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			2013	2014	2015	2016	2017	2018	2019	2020
373	Mærsk Olie og Gas A/S	Tyra feltet omfattende anlæg på platformene Tyra Vest A, -B, -C, -D og -E samt Tyra Øst A, -B, -C, -	526.593	517.446	508.192	498.842	489.391	479.848	470.186	460.490
374	Mærsk Olie og Gas A/S	Halfdan feltet omfattende anlæg på platformene Halfdan HDA, -HDB, -HDC og -HBA	102.177	100.402	98.607	96.792	94.958	93.107	91.232	89.351
375	Dong Efterforskning & Produktion	Siri feltet omfattende anlæg på Siri platformen	80.804	79.400	77.980	76.545	75.095	73.630	72.148	70.661
376	Hess Denmark ApS	Syd Arne feltet omfattende anlæg på Syd Arne platformen	36.203	35.575	34.938	34.295	33.646	32.990	32.325	31.659
378	Helsinge Fjernvarme AMBA	Helsinge Fjernvarme	8.591	7.688	6.811	5.962	5.139	4.342	3.572	2.830
380	Colas A/S	Colas Sundholmen, Nørresundby	1.388	1.242	1.100	962	828	700	575	456
382	Effektmarked.DK A/S	Effektmarked DK A/S	22	20	17	15	13	11	9	7
383	Gartneriet Hjortebjerg I/S	Hjortebjerg Kraftvarme/Gartneriet Hjortebjerg I/S	2.173	1.945	1.723	1.508	1.300	1.098	904	716
384	Lemminkäinen A/S	Lemminkäinen A/S - Vandel Asfaltfabrik	1.459	1.306	1.156	1.012	872	736	605	479
387	Centralkommunernes Transmissionsselskab I/S	CTR, KLC2 - Københavns Lufthavn	2.577	2.307	2.042	1.787	1.539	1.300	1.068	845
388	Energi Fyn Produktion A/S	Energi Fyn Produktion - Kratholm	82	74	66	57	49	42	34	27
389	Aulum Fjernvarme A.m.b.a.	Aulum Fjernvarme A.m.b.a. (Rugbjergvej 3)	62	56	49	43	37	31	25	21
390	Aulum Fjernvarme A.m.b.a.	Aulum Fjernvarme A.m.b.a. (Kulvej 5)	5.938	5.314	4.707	4.120	3.551	3.001	2.469	1.956
391	Energi Fyn Produktion A/S	Energi Fyn Produktion - Assens	120	107	96	83	72	60	50	40
399	Energi Fyn Produktion A/S	Energi Fyn Produktion - Regulerkraftanlæg Esbjerg	11	10	9	8	7	5	4	4
400	DK plant aps	DK plant aps	4.334	3.878	3.436	3.007	2.592	2.190	1.802	1.427
403	Energi Fyn Produktion A/S	Energi Fyn Produktion - OUH_Nød og regulerkraftanlæg	28	26	22	19	17	15	12	10
202197	I/S Amager Ressourcecenter	Amagerforbrænding	151.298	135.396	119.947	104.987	90.495	76.475	62.907	49.826
202591	I/S Reno Nord	I/S Reno Nord	68.774	61.546	54.524	47.723	41.136	34.762	28.596	22.649
202613	Odense Kraftvarmeværk A/S	Odense Kraftvarmeværk A/S	99.790	89.302	79.113	69.244	59.687	50.440	41.490	32.863
202700	Kerteminde Forsyning - Varme A/S	Lindø Kraftvarmeværk	5.322	4.763	4.219	3.693	3.183	2.690	2.213	1.753
202826	I/S Refa	Affaldsforbrændingsanlæg I/S REFA	33.542	30.017	26.592	23.275	20.063	16.954	13.946	11.046
202828	Haderslev Kraftvarmeværk A/S	Haderslev Kraftvarmeværk A/S	17.254	15.441	13.679	11.973	10.320	8.721	7.174	5.682
202911	I/S Aars Varmeværk	I/S Aars Varmeværk	17.978	16.088	14.252	12.475	10.753	9.087	7.475	5.921
202996	Svendborg Kraftvarme A/S	Svendborg Kraftvarme A/S	17.814	15.942	14.123	12.361	10.655	9.004	7.407	5.866
203364	I/S Nordforbrænding	I/S Nordforbrænding	44.953	40.229	35.638	31.193	26.888	22.722	18.690	14.804
203614	TAS, Trekantområdets Affaldsselskab I/S	Kolding Forbrændingsanlæg	58.849	52.664	46.655	40.836	35.199	29.746	24.469	19.380
203845	L 90 (Leverandørforeningen af 1990)	L-90 Affaldskraftvarme Esbjerg	78.310	70.079	62.084	54.339	46.839	39.582	32.560	25.789
203937	I/S Reno Syd	I/S Reno Syd	22.079	19.759	17.504	15.321	13.206	11.161	9.180	7.271
204108	KARA/NOVEREN I/S	KARA/NOVEREN Forbrændingsanlæg	70.988	63.527	56.279	49.259	42.460	35.882	29.515	23.379
204462	Hammel Fjernvarmeselskab A.m.b.a.	Hammel Fjernvarmeselskab	13.379	11.973	10.605	9.279	7.994	6.749	5.546	4.387
205514	I/S AffaldPlus	Slagelse forbrændingsanlæg	14.953	13.383	11.854	10.371	8.935	7.544	6.199	4.903
205550	Affaldsselskabet Vendsyssel Vest I/S	AVV-Forbrændingsanlæg	26.474	23.691	20.988	18.370	15.834	13.381	11.007	8.719
205619	AffaldVarme Århus, Århus Kommune	Affaldscenter Aarhus, Forbrændingsanlægget	94.153	84.258	74.644	65.334	56.315	47.590	39.147	31.007

Danish National Allocation table for the period 2013-2020 for Aviation

Allocation of free CO_2 allowances for the years 2013 – 2016 and the Danish Energy Agency´s preliminary allocation of free CO_2 allowances for the years 2017 - 2020.

In 2012, CO_2 emissions from aviation were covered by the EU ETS. The legislation adopted in 2008 was intended to apply to emissions from flights to and from, as well as within the European Economic Area (EEA), which are the 28 EU Member States including Iceland, Liechtenstein and Norway.
In 2014, the EU decided to revise aviation activities within the EU ETS. These changes are set out in Regulation 421/2014 applicable for the period 2013-2016. The changes limited the scope of the EU ETS for intra-EEA flights to support the development of a global action by the International Civil Aviation Organization (ICAO).
The European Commission has proposed continuing the current approach after 2016. This proposal is under consideration by the European Parliament and the Council of the European Union.
The table above shows the Danish Energy Agency's preliminary aviation allocations based on the current legislation; Regulation 421/2014 and requires that the European Commission's proposal to continue the current allocation will be adopted.
It is also assumed that the conditions for allocation are present.

[1] Special reserve new entrant
[2] Special reserve fast grower

Aircraft operator ID	Aircraft operator (CRCO/ETS) ID	Aircraft operator name	Allocation							
			2013	2014	2015	2016	2017	2018	2019	2020
202890	3456	Air Alsie A/S	403	403	403	403	403	403	403	403
201992	22466	Air Greenland AS	158	158	158	158	158	158	158	158
203125	34774	ALIGAP A-S	10	10	10	0	0	0	0	0
202452	142	Atlantic Airways P/F	608	608	608	608	608	608	608	608
201417	38870	Cimber A/S	102.360	102.360	102.360	102.360	102.360	102.360	102.360	102.360
202893	366	Danish Air Transport A/S	5.849	5.849	5.849	5.849	5.849	5.849	5.849	5.849
203356	26272	Execujet Europe A/S	0	0	0	0	100[1]	100[1]	100[1]	100[1]
201630	32158	Jet Time A/S	37.740	37.740	37.740	37.740	46.400[2]	46.400[2]	46.400[2]	46.400[2]
201419	12230	Nordic Aviation Capital A/S	9	9	9	9	9	9	9	9
201580	35196	Primera Air Scandinavia	44.049	44.049	44.049	44.049	44.049	44.049	44.049	44.049
201405	9918	Star Air A/S	97.821	97.821	97.821	97.821	97.821	97.821	97.821	97.821
202817	4357	SUN-AIR of Scandinavia	6.004	6.004	6.004	6.004	6.004	6.004	6.004	6.004
202332	10500	The Duchossois Group, Inc..	0	0	0	0	0	0	0	0
201626	21484	Thomas Cook Airlines Scandinavia A/S	176.545	176.545	176.545	176.545	176.545	176.545	176.545	176.545

Annex A3 Information on Denmark's KP Registry

Contents:

a. Information on the registry administrator

Danish Business Authority
Dahlerups Pakhus
Langelinie Allé 17
DK-2100 København Ø
Telephone: +45 3529 1000
E-mail: co2register@erst.dk

b. Cooperation with other countries concerning the operation of the registry

Denmark does not cooperate with other countries concerning the administration of the Danish KP Registry. The Danish KP Registry has been operated in a consolidated manner by the European Commission since June 2012. The administration of the registry remains with the Danish Business Authority.

c. Database structure and capacity

The complete description was provided in the common readiness documentation and specific readiness documentation for the national registry of EU and all consolidating national registries and the changes is provided and assessed in the yearly Supplementary Independent Assessment Report (SIAR).

As the database structure and capacity is treated as confidential, no further descriptions are provided here. Relevant parties can request further information. This will then be provided, to the extent possible, by the national administrators.

d. Standards for data exchange

When changes are made in the registry software of the Consolidated System of EU Registries new conformance testing with the ITL takes place. The complete description and test results of the consolidated registry was provided and assessed in the yearly Supplementary Independent Assessment Report (SIAR).

The testing demonstrates capacity and conformance to the DES. The latest tests were executed successfully on 18 January 2017.

e. Procedures for administration and operation of the KP registry

The procedures are described in Commission Regulation (EU) No 389/2013 of 2 May 2013 establishing a Union Registry pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Decisions No 280/2004/EC and No 406/2009/EC of the European Parliament and of the Council. Further procedures are set in Executive Order No 95 of 29 January 2015 on the EU ETS Registry and the Danish KP Registry. Denmark is in compliance with the procedures set in and pursuant to the regulation and executive order.

f. Safety standards

The security plan of the Consolidated System of EU Registries is updated regularly. The complete description was provided in the common readiness documentation and specific readiness documentation for the national registry of EU and all consolidating national registries and the changes is provided and assessed in the yearly Supplementary Independent Assessment Report (SIAR).

As security and safety standards are treated as confidential, no further descriptions are provided here. Relevant parties can request further information. This will then be provided, to the extent possible, by the national administrator.

g. Information available to the public

Pursuant to article 109 in Commission Regulation (EU) No 389/2013 of 2 May 2013 establishing a Union Registry pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Decisions No 280/2004/EC and No 406/2009/EC of the European Parliament and of the Council only the information specified in Annex XIV of the regulation is available to the public. Publicly available information from the registry can be found at http://ec.europa.eu/environment/ets/. General information can be found at https://danishbusinessauthority.dk/eu-ets-registry-and-danish-kyoto-registry.

h. Internet address for the registry
https://ets-registry.webgate.ec.europa.eu/euregistry/DK/index.xhtml

i. Protection, maintenance and recreation of data
The disaster recovery plan of the Consolidated System of EU Registries is updated regularly. The complete description was provided in the common readiness documentation and specific readiness documentation for the national registry of EU and all consolidating national registries and the changes is provided and assessed in the yearly Supplementary Independent Assessment Report (SIAR).

As the disaster recovery plan is treated as confidential, no further descriptions are provided here. Relevant parties can request further information. This will then be provided, to the extent possible, by the national administrators.

j. Test procedures
Regarding Consolidated System of EU Registries, the European Commission is responsible for test procedures and all relevant functionality tests related to operations and software/hardware updates. Furthermore, each member state has the possibility to test new releases before they are put in production.

As test procedures and results are treated as confidential, no further descriptions are provided here. Relevant parties can request further information. This will then be provided, to the extent possible, by the national administrators.

Annex A4 Publicly available registry information - 2017 KP Reports

Contents:

TABLE A4.1: 2017 KP REPORTS - PUBLIC INFORMATION ON ACCOUNT INFORMATION*

Account Name	KP Account Type	CP	Account Holder
Frivillig annulleringskonto:DK1	Voluntary cancellation	0	Energistyrelsen
Annullering CP1:DK502	Voluntary cancellation	1	Energistyrelsen
Frivillig annullering CP2	Voluntary cancellation	2	Erhvervsstyrelsen
national EU-retirement:DK4	Retirement account	0	Energistyrelsen
Tilbagetrækning CP1:DK501	Retirement account	1	Energistyrelsen
Net Source Canc	NET SOURCE CANCELLATION ACCOUNT	1	Energistyrelsen
Nettokildeannulleringskonto	NET SOURCE CANCELLATION ACCOUNT	1	Erhvervsstyrelsen
Annulleringskonto for manglende overholdelse	NON COMPLIANCE CANCELLATION ACOUNT	1	Erhvervsstyrelsen
Annulleringskonto for overskydende udstedelse	EXCESS_ISSUANCE_CANCELLATION_ACCOUNT	1	Erhvervsstyrelsen
Obligatorisk annulleringskonto	MANDATORY CANCELLATION ACCOUNT	1	Erhvervsstyrelsen
Erstatningskonto for tCER, som er ved at udløbe	TCER REPLACEMENT ACCOUNT EXPIRY	1	Erhvervsstyrelsen
Erstatningskonto for lCER, som er ved at udløbe	LCER REPLACEMENT ACCOUNT EXPIRY	1	Erhvervsstyrelsen
Erstatningskonto for lCER til tilbageførsel af oplagring	LCER REPLACEMENT ACCOUNT REVERSAL CARBON STORAGE	1	Erhvervsstyrelsen
Erstatningskonto for lCER ved manglende indgivelse af certificeringsrapport	LCER REPLACEMENT ACCOUNT FAIL SUBMISSION CERT REP	1	Erhvervsstyrelsen
Dan:DK67	Operator Holding		MÆRSK OLIE OG GAS A/S
Energi Danmark	Person Holding		Energi Danmark A/S
Harish kvoter	Person Holding		ØRSTED Salg & Service A/S
Rockwool	Person Holding		Rockwool International A/S
AAU-depotkonto	National Holding (Party)		Erhvervsstyrelsen
CER/ERU returneringskonto	National Holding (Party)		Erhvervsstyrelsen
DK deposit	National Holding (Party)		Energistyrelsen
DK PHA-overskud	National Holding (Party)		Erhvervsstyrelsen
Grønland	National Holding (Party)		Erhvervsstyrelsen
NEFCO NeCF	National Holding (Party)		Energistyrelsen
NEFCO TGF	National Holding (Party)		Energistyrelsen
POST 2010 - Malay 3662+5150 UP3+4	National Holding (Party)		Energistyrelsen
POST 2012 Thai 1552 NBF	National Holding (Party)		Energistyrelsen
POST 2012 - Thai 1554 VCF	National Holding (Party)		Energistyrelsen
POST 2012 - Thai 1558 SPM	National Holding (Party)		Energistyrelsen
POST 2012 – Thai 4214 SIMA 1 - ENS' konto	National Holding (Party)		Erhvervsstyrelsen
Thai 4214 SIMA 1 - ENS' konto	N ational Holding (Party)		Erhvervsstyrelsen
Statens CDM pro	National Holding (Party)		Energistyrelsen
statens frivillige annullering	National Holding (Party)		Erhvervsstyrelsen
statens off-set	National Holding (Party)		Erhvervsstyrelsen
Thai 1558 SPM	National Holding (Party)		Energistyrelsen
til DK compliance	National Holding (Party)		Erhvervsstyrelsen
Verdensbanken	National Holding (Party)		Energistyrelsen

** Please note that information on account number and information related to account representatives is not included due to confidentiality*

TABLE A4.2: 2017 KP REPORTS - PUBLIC INFORMATION ON LEGAL ENTITIES

Legal Entity	Address Line 1	Address Line 2	Postal Code	City	Country
ØRSTED Salg & Service A/S	Kraftværksvej 53	Skærbæk	7000	Fredericia	DK
Energi Danmark A/S	Hedeager 5		8200	Aarhus N	DK
Energistyrelsen	Amaliegade 44		1256	København K	DK
Erhvervsstyrelsen	Langelinie Allé 17		2100	København Ø	DK
MÆRSK OLIE OG GAS A/S	Esplanaden 50		1263	København K	DK
Rockwool International A/S	Hovedgaden 584	Fløng	2640	Hedehusene	DK

Annex B Policies and measures information

This annex contains the following information:

Annex B1: Overview of Denmark's portfolio of climate relevant policies and measures.

Annex B2: The 2005 Effort Analysis.

Annex B3: The 2013 Analysis of the Effects of Selected Policies and Measures.

Annex B4: The 2017 Analysis of CO_2-reduction effects of renewable energy measures and energy efficiency measures.

Annex B1 Overview of Denmark's portfolio of climate relevant policies and measures

Overview of Denmark's portfolio of climate relevant policies and measures			
EEA PAMs Database no.	Name of mitigation action	Single PAM or Group of PAMs	PAMs included in Groups of PAMs
2	TD-1b: Mineral-oil Tax Act	Single	
3	TD-2: Gas Tax Act	Single	
4	TD-3: Coal Tax Act	Single	
5	TD-4: Electricity Tax	Single	
6	TD-5: CO2 tax on energy products	Single	
7	TD-6: Green Owner Tax - a fuel-efficiency-dependent annual tax on motor vehicles	Single	
8	TD-7: Registration Tax - a fuel-efficiency-dependant registration tax on passenger cars and vans	Single	
9	TD-8: Tax on HFCs, PFCs and SF6 - equivalent to the CO2 tax	Single	
10	TD-9: Tax on methane from natural gas fired power plants - equivalent to the CO2 tax	Single	
11	EN-1: EU-CO2-emission trading scheme for electricity and district heat production and certain industrial processes (incl. Business) and aviation from 2012	Single	
12	EN-2: Biomass Agreement (Agreement on the use of biomass in electricity production)	Single	
13	EN-3: Price supplement and subsidies for renewable energy production	Single	
14	EN-4: Tenders for offshore wind turbines	Single	
15	EN-5(expired): Scrapping scheme for old wind turbines	Single	
16	EN-6: Energy development and demonstration	Single	
17	BU-1: Agreements on energy efficiency with business	Single	
18	BU-2: Savings activities by elec. grid, gas, oil and district heating companies (consump. of final energy excl. Transp.)	Single	
19	BU-6: Circular on energy-efficiency in state institutions	Single	
20	BU-7(expired): Campaigns and promotion of efficient appliances (including elec. heating, conversion and efficient appliances in households)	Single	
21	BU-8(expired): Renewables for the industry	Single	
22	BU-9: Mandatory Energy Audit for large Enterprises	Single	
23	BU-10: The center for energy savings in enterprises	Single	
24	TR-1a: EU demands on vehicle manufactures to deliver fuel efficient cars and vans	Single	
25	TR-1b(expired): Information campaign on fuel consumption of new cars	Single	
26	TR-2(expired): Energy-correct driving technique	Single	
27	TR-3(expired): Initiative on enforcing speed limits	Single	
28	TR-4(expired): Establishment of intermodal installations	Single	
29	TR-5(expired): Promotion of environmentally friendly goods transport	Single	
30	TR-6(expired): Reduced travel times for public transport	Single	
31	TR-7: Spatial planning	Single	
32	TR-8: EU requirements regarding biofuels	Single	
33	TR-9(expired): Transport infrastructure projects in the fields of electric vehicles, gas and hydrogen	Single	
34	TR-10: Electrification of parts of the rail infrastructure	Single	
35	TR-11(expired): Investments in a new metro line and bicycle transport facilities.	Single	
36	TR-12: Investment in a tunnel under the Femern Belt	Single	
37	HO-1: Energy labelling of small and large buildings (incl. public sector and business)	Single	
38	HO-2: Energy labelling of electric appliances	Single	
39	HO-3: Substitution of individual oil-based furnaces	Single	
40	HO-4: Better Houses	Single	
41	HO-5: Strategy for Energy renovation of buildings	Single	
64	HO-6 (new): Heat pumps as an energy service	Single	
42	IP-1: Regulation of use of HFCs, PFCs and SF6 (phasing out most of the uses)	Single	
43	AG-1(expired): Action Plan for the Aquatic Environment I+II and Action Plan for Sustainable Agriculture	Single	
44	AG-2(expired): Action Plan for the Aquatic Environment III	Single	
45	AG-4a/4b/4c/4d/4e: Reduced emissions of ammonia	Single	
46	AG-4f: Environmental Approval Act for Livestock Holdings	Single	
47	AG-6: Biogas plants	Single	
48	AG-9(expired): Agreement on Green Growth	Single	
65	AG-11(new+expired): Agreement on Green Growth 2.0	Single	
66	AG-12(new): Political Agreement on a Food and Agricultural Package	Single	
67	AG-13(new): Agreement on Nature (the Nature Package)	Single	
49	LU-1: Ban on burning straw on fields	Single	
50	LU-2: Planting of windbreaks	Single	
51	LU-3: Subsidies scheme for private afforestation on agricultural land (increase the forest area in Denmark)	Single	
52	LU-4: Public afforestation (state and municipalities)	Single	
53	LU-5: Subsidy for conversion of arable land on organic soils to nature	Single	
54	WA-1: A ban of landfill of combustible waste.	Single	
55	WA-2: The waste tax	Single	
56	WA-3: Weight-and-volume-based packaging taxes	Single	
57	WA-4: Subsidy programme – Enterprise Scheme (special scheme for businesses)	Single	
58	WA-5: Increased recycling of waste plastic packaging	Single	
59	WA-6: Implementation of the EU landfill directive	Single	
60	WA-7(expired): Support for (construction of facilities for) gas recovery at landfill sites	Single	
61	WA-8(expired): Subsidy programme for cleaner products	Single	
62	WA-9: Subsidy programme for biocovers on landfills	Single	
63	G1 (changed): Group of all policies and measures except in the LULUCF sector	Group	TD-b1, -2, -3, -4, -5, -6, -7, -8, -9; EN-1, -2, -3, -4, -5, -6; BU-1, -2, -6, -7, -8, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12; HO-1, -2, -3, -4, -5, -6; IP-1; AG-1, -2, -4a-f, -6, -9, -11, -12, -13; WA-1, -2, -3, -4, -5,- 6, -7, -8, -9
1	G2 (former TD-1a): Energy taxes except on mineral oil	Group	TD-2, TD-3 and TD-4
68	G3: All RE mitigation actions (Renewable Energy) since 1990	Group	EN-2, EN-3, EN-4, EN-5, BU-8 and TR-8
69	G4: All EE mitigation actions (Energy Efficiency) since 1990	Group	TD-b1, -2, -3, -4, -5, -6, -7; EN-1; BU-1, -2, -6, -7, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -10, -11, -12; HO-1, -2, -3, -4, -5, -6
[70]	G5 (new G.): Energy effciency in transport by passenger cars	Group	TD-6, TR-1a, TR-1b, TR2 and TR-3
[71]	G6 (new G.): F-gas taxes and regulation	Group	TD-8 and IP-1
[72]	G7 (new G.): LULUCF activities	Group	LU-1, -2, -3, -4 and -5

Annex B2 The 2005 Effort Analysis

Summary

Since 1990, a broad range of national policies and measures have been implemented in Denmark that have impacted on emissions of greenhouse gases. Some initiatives have been implemented with CO_2 reduction as the primary aim, while other initiatives have been motivated by other aims.

The *Effort Analysis*[1] reports on Denmark's effort related to the reduction of greenhouse gas emissions undertaken on national level in the period 1990-2001, and the costs of this effort.

Under the Kyoto Protocol and the EU's subsequent Burden Sharing Agreement, Denmark has undertaken to reduce greenhouse gas emissions by 21% in 2008-2012, compared to 1990 levels[2]

One of the additional requirements of the Kyoto Protocol is that the use of flexible mechanisms must be supplemental to domestic action. The calculation of the total Danish effort is relevant in this connection.

It is therefore relevant to consider the effects of Denmark's efforts both in relation to the Kyoto accounting, and in relation to the total effect - regardless of whether the emissions reductions have been in Denmark or abroad.

In relation to the Kyoto accounting, which is based on the CO_2 impact associated with the specific emissions in Denmark, it is expected that part of the effect of the energy sector initiatives will be offset by increased electricity exports. This means that the CO_2 emissions linked to the exported electricity component have a negative impact on Denmark's Kyoto accounting, rather than on that of the electricity importing country.

Choice of measures

The *Effort Analysis* report aimed to include the most important environment and energy policy measures implemented in the period 1990-2001 that have had a significant effect on greenhouse gas emissions.

Please note that many of the measures have not been planned and adopted with the aim of contributing to the fulfilment of Denmark's Kyoto obligation, but derive from the political objective from 1990 (in the "*Energy 2000* action plan) of reducing CO_2 emissions from Denmark's energy consumption by 20% between 1988 and 2005. Thus the *Effort Analysis* does not evaluate the implemented initiatives against their original objective, but rather in relation to reducing greenhouse gases, and how much the implemented initiatives will contribute to the binding Kyoto objectives that exist today.

The chronological definition of the initiatives is not always straightforward. Some initiatives were introduced prior to 1990, but the implementation (and associated reduction in greenhouse gas emissions) has taken place after 1990. This is the case, for example, for the conversion to natural gas and for Action Plan for the Aquatic Environment I. The calculations in the *Effort Analysis* only include the CO_2 reductions that have taken place after 1990.

Denmark's effort in the period 1990-2001

The *Effort Analysis* evaluates the effects of measures implemented in the period 1990-2001 in relation to the actual emissions in 2001, and in relation to the expected average annual emissions in 2008-2012, as laid down in the base projection used as a basis for the Danish climate strategy from February 2003 (i.e. the previous 'with measures' projection, which only took into account the

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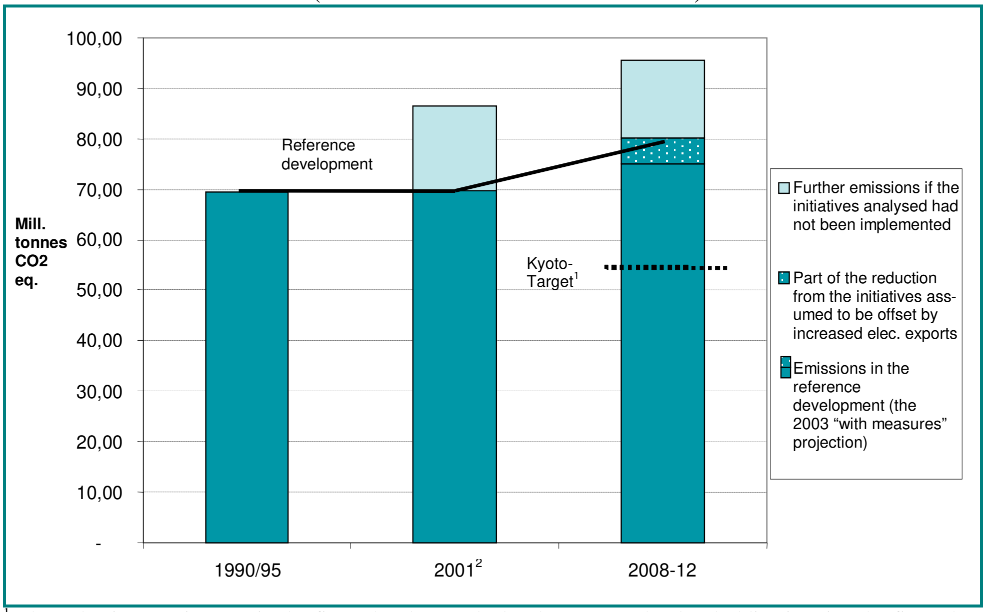
[1] The Effort Analysis is published in the report "Danmarks udledning af CO_2 – indsatsen i perioden 1990-2001 og omkostningerne herved (Denmark's CO_2 Emissions – Efforts in the Period 1990-2001 and the costs involved) – Main and Annex Report, Statement from the Danish EPA no. 2 and 3, 2005 (in Danish).

[2] However, in 2002 the (Environment) Council and the Commission adopted a political declaration stating that the calculation of the assigned amounts (measured in tonnes) in 2006 shall take into account Denmark's statement in connection with the Burden Sharing Agreement in 1998, i.e. stating that Denmark's reductions shall be seen in relation to an adjusted 1990 level, and that the adoption of additional common European measures is assumed.

effects of measures implemented or adopted before the Climate Strategy). Initiatives adopted after 2001 are therefore not included in the results of the *Effort Analysis*, and hence these results cannot be used as a total status report for the Danish efforts in relation to the Kyoto target.

The *Effort Analysis* reports on and calculates the Danish initiatives by considering their total effect, regardless of whether they have resulted in reductions in emissions in Denmark or abroad. However, the analysed initiatives have also been assessed in relation to Denmark's international obligations under the Kyoto Protocol, based on the CO_2 impact associated with the specific emissions in Denmark. Figure B2-1 illustrates how much greater Denmark's CO_2 emissions would have been in 2001 and in 2008-12 if the initiatives analysed had not been implemented.

FIGURE B2.1: DEVELOPMENTS IN TOTAL CO_2 EQUIVALENT EMISSIONS, WITH AND WITHOUT THE MEASURES UNDER ANALYSIS (PRODUCTION-BASED CALCULATION)



[1] The reduction requirement in the figure has been calculated as Denmark's legal obligation. i.e. the figure has not been corrected for the particularly large electricity imports in the 1990 base year. However, in 2002 the (Environment) Council and the Commission adopted a political declaration stating that the calculation of the assigned amounts (measured in tonnes) in 2006 shall take into account Denmark's statement in connection with the Burden Sharing Agreement in 1998, e.g. stating that Denmark's reductions shall be seen in relation to an adjusted 1990 level. When this factor is taken into account, the reduction requirement would be reduced by up to 5 million tonnes annually.

[2] The reduction calculated in 2001 includes the full effects, i.e. it includes the CO_2 reductions that domestic actions have led to in other countries.

As Figure B2.1 shows, the initiatives under consideration are estimated to give rise to CO_2 reductions of approx. 20.6 million tonnes per year in the 2008-12 period. This expresses the total effect of Denmark's effort in the 1990-2001 period. It also shows (see below) that part of the effect of energy sector initiatives is expected to be offset by increased electricity exports, such that in relation to the Kyoto emission accounting, the initiatives under consideration are estimated to lead to CO_2 reductions of approx. 15.6 million tonnes per year in the 2008-12 period.

A number of the initiatives implemented have been aimed at reducing CO_2 emissions from Danish electricity consumption. However, Danish electricity production is integrated into the Northern European electricity market, and the effect of initiatives in the electricity sector are – and are expected to continue to be – partially offset by increased exports of fossil fuel electricity production from Denmark. Estimation of the size of this effect is subject to extreme uncertainty. Based on a rudimentary assumption that 50% of the effects of the electricity sector initiatives will be offset by electricity exports, approx. 5.0 of the 20.6 million tonnes of CO_2 will be offset by increased electricity exports. This estimate is subject to significant uncertainty and depends, for example, on the future expansion of production capacity in the Scandinavian countries (cf. the background report, "*Energy policy initiatives in the 1990's: Costs and CO_2 effects*[3])

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[3] Danish Energy Authority 2005, Published electronically in May 2005 on the Authority's website (http://www.ens.dk/graphics/Publikationer/Energipolitik/Energipolitiske_tiltag_i_1990erne/pdf/energipol_tiltag_CO2effekt.pdf)

The *Effort Analysis'* 'without measures' calculation of CO_2 emissions per sector is shown in Table B2.1.

TABLE B2.1: OVERVIEW OF TOTAL GREENHOUSE GAS EMISSIONS AND THE TOTAL REDUCTIONS DIVIDED BY SECTOR (FOLLOWING THE SECTOR DIVISION OF THE CLIMATE STRATEGY) IN MILLIONS OF TONNES OF CO_2 EQUIVALENTS PER YEAR

Sector	1990/95[1]	2001			2008-12		
	Base[2]	Current emissions[2]	Reductions from measures	Emissions without measures	Emission projection[2]	Reductions from measures	Emissions without measures
Energy	42.7	43.2	13.5	56.8	53.1	11.0/16.0[3)]	64.1
Transport	10.7	12.6	1.3	13.9	14.6	1.7	16.3
Industry	0.3	0.7	0.0	0.7	0.7	0.4	1.1
Agriculture	14.4	11.7	1.6	13.3	10.8	1.9	12.7
Waste	1.3	1.2	0.2	1.4	0.9	0.5	1.4
Total	**69.5**	**69.6**	**16.7[3]**	**86.2**	**80.1**	**15.6 /20.6[4]**	**95.6**

[1] 1990/95 indicates the emissions in the base year. CO_2, CH_4 and N_2O emissions have 1990 as the base year, while the industrial gases have 1995 as the base year. No corrections have been made for electricity imports/exports.
[2] Source: Emissions figures (base, current in 2001 and projections for 2008-12: Danish Ministry of the Environment 2003)
[3] These 16.7 million tonnes CO_2 per year include the full effects, i.e. they include the CO_2 reductions that domestic actions have led to abroad.
[4] For the energy sector measures the full reduction is specified. The Danish Energy Authority estimates that approx. 5.0 of these 20.6 million tonnes CO_2 annually will be offset by increased electricity exports based on the calculation assumptions of the climate strategy.

The *Effort Analysis* estimates that Denmark's "without measures CO_2 emissions in 2008-12 would have been 95.7 million tonnes CO_2 annually. Denmark's legal reduction obligation of 21% in relation to 1990 levels corresponds to emissions in 2008-2012 being reduced to approx. 54.9 million tonnes CO_2 annually[20]. Denmark would have therefore fallen short of this goal by 40.7 million tonnes CO_2 annually in 2008-2012 if the initiatives analysed had not been implemented.

In summary, the effect between 2008-2012 of the initiatives analysed would be 15.6 million tonnes annually, after taking into account that 50% of the electricity sector initiatives are expected to be offset by electricity exports.

As mentioned above, the total reduction effects, in Denmark and abroad, from the implemented domestic initiatives can be estimated at 20.6 million tons annually. Therefore it can be concluded that Denmark has already made significant progress domestically.

Extensive Danish electricity imports from Norway and Sweden in the 1990 base year led to unusually low Danish emissions. If the effects of these imports are compensated for, it would allow Denmark to reduce Danish emissions by approx. 5 million tonnes less than specified above.

In 2002, the (Environment) Council and the Commission adopted a political declaration stating that the calculation of the permitted emission volumes (measured in tonnes) in 2006 shall take into account Denmark's statement in connection with the Burden Sharing Agreement in 1998, e.g. stating that Denmark's reductions shall be seen in relation to an adjusted 1990 level.

Costs of measures

The costs of the CO_2 reduction have also been estimated in the *Effort Analysis*, but only for selected measures. The choice of these measures has largely been governed by which measures CO_2 costs had previously been calculated for.

The estimate is based on a cost-benefit analysis of the total costs and benefits for each measure, excluding the value of the reduction in CO_2 emissions.

An expression of the total socio-economic costs per tonne of reduced CO_2 emissions (also called the initiative's CO_2 shadow price) can be found by comparing the total net costs of the initiative against the estimated resultant CO2 reduction. The total CO_2 reduction has been used, i.e. regardless of whether this CO_2 reduction took place in Denmark or abroad (consumption-based calculation).

This corresponds to the method used in previous analyses carried out by the Danish Ministry of Finance and others in 2001, by the Economic Council in 2002, and in cost estimations used in the Government's climate strategy from 2003.

Please note that the introduction of the EU's CO_2 allowance scheme (EU-ETS) from 2005 changes the framework conditions for large parts of the energy sector and energy-intensive industry, such that the calculation method cannot be used to assess future measures within these areas where quotas have been imposed. The introduction of the allowance scheme means that CO_2 emissions from the sectors subject to allowances, including electricity production, will be unequivocally determined by the total amount of allowances accounted in accordance with the Kyoto Protocol. The calculations of the shadow values for the areas subject to allowances, up until the 2008-12 period where the new Kyoto regime will have entered into force, thus serve purely illustrative purposes.

The introduction of the open international electricity market since the late 1990s means it is no longer certain that for example such as the expansion of renewable energy will reduce CO_2 emissions from Danish electricity producers correspondingly, as it may be an advantage for producers to export electricity rather than reduce production. Where this is the case, CO_2 emissions will be reduced in other countries instead. This is a major issue in relation to calculating how great an effect the measures will have in relation to the base projection.

Please note that the CO_2 allowance scheme will increase the European electricity price and thus increase the profitability of electricity savings compared to the situation today.

Note that no attempt has been made in the *Effort Analysis* to incorporate any positive effects on security of supply, technology development and commercial development, nor has it been possible to include the value of all environmental impacts. This is due to the difficulty of quantifying and valuing these effects, which in principle should be included.

The value of the reductions in SO_2 and NO_x emissions resulting from the measures has been included, but the valuation of these physical reductions is very uncertain. This report uses the same valuations as the climate strategy. Since the calculations were carried out, the National Environmental Research Institute, Denmark (NERI) has published new, higher valuations for the cost of the negative impacts of SO_2 and NO_x emissions. Using these new, updated assumptions from NERI – and with nothing else changed – the calculations would have resulted in lower CO_2 shadow prices for several measures.

Table B2.2 shows that the shadow costs for the selected measures vary substantially, and for most of the measures are higher than the indicator of DKK 120 per tonne CO_2 specified in the Government's climate strategy. In the energy sector, the "Grant for conversion of apartments for the aged to cogenerated heat and power, "Grants for solar heating, heat pumps, and biomass and "Building labelling measures are estimated to have been associated with the highest costs in relation to their CO_2 reduction, while the "Grant to cover CO_2 tax (agreement scheme) and "Expansion in decentralised cogeneration of heating and power have been associated with the lowest costs.

Note that the calculations are generally subject to significant uncertainty and it has not been possible to include all the socio-economic effects in the calculations. For example, the benefit of increased comfort associated with the transition to CHP has not been included in the calculation of the net costs for the "Grant for conversion of old dwellings to cogenerated heat and power initiative. Many of the measures will also have a positive effect on the security of the energy supply, which has not been valued.

Please refer to the annex report to the *Effort Analysis* and to "*Energy policy measures in the 1990s: Costs and CO_2 effects* for further description of the conditions and assumptions underlying the calculation of the shadow price for each measure.

TABLE B2.2: HISTORICAL CO_2 SHADOW PRICES FOR SELECTED MEASURES (CONSUMPTION-BASED CALCULATION)

Sector	Measure	Average annual CO_2 reduction for 2008-2012 Mill. tonnes CO_2 per year	Socio-economic cost[1] per tonne CO_2 DKK/tonne CO_2 (2002 prices)
Energy	Grants to private wind turbines	3.4	275
	Electricity generation plant expansion using wind turbines	0.9	250
	Expansion in decentralised cogeneration of heating and power	2.1	100
	Agreement on use of biomass for electricity production	1.1	325
	Grants for energy savings in businesses	0.9	275
	Grant to cover CO_2 tax (agreement scheme)	0.6	0
	Grant for conversion of old dwellings to cogenerated heat and power	0.2	1,925[2]
	Grant to promote connection to coal-fired CHP	0.1	850
	Grants for solar heating, heat pumps, biomass	0.1	1,500[3]
	Building labelling	0.4	1,300
Tax measures	Changes to taxes on energy products[4]	1.5	325
	Increased taxes on fuel[4]	1.2	775[5]
Industry	Regulation of industrial gases	0.4	200[6]

[1] The shadow price has been calculated based on the total CO_2 reduction.
[2] This measure has also lead to improved comfort for those who have changed to CHP. This is believed to have been part of the political motive for the measure. However, no attempt has been made to value this gain.
[3] Weighted average. This shadow price covers three initiative areas with very different shadow prices. Solar heating (DKK 5,700 /tonne CO_2), Heat pumps (DKK 650/tonne CO_2) and Biomass (DKK 600/tonne CO_2).
[4] The effect and the shadow price have been estimated for 2001 based on the nominal tax increase from 1990 to 2001. Assuming there are no changes in demand, and constant real prices and taxes, it will also be possible to use this estimate for the 2008-12 period. Note that these assumptions are not fully compatible with the assumptions about changes to fuel prices associated with the energy measures.
[5] The CO_2 reduction has been calculated for all fuel consumption, i.e. fuel consumption for both passenger cars and trucks. However the shadow price has only been calculated for fuel consumption in passenger cars, corresponding to the calculations carried out in connection with the Government's 2003 Climate Strategy.
[6] Industrial gases are used for many purposes. The illustrated shadow price has been calculated, as an example, for the costs of replacing HFC gases with more environmentally-friendly refrigerants in industrial refrigeration plant, the biggest consumption group within the affected industrial gases.

Uncertainty and sensitivity analyses

Both the CO_2 reductions and shadow costs for the analysed measures are subject to significant uncertainty due to the complexity and scope of the calculations alone. The following key issues in relation to the uncertainty of the results should be highlighted:

- It is not unequivocally clear how the demarcation of an initiative should be carried out. This applies both to choosing which measures to include and, in certain cases, how to define each initiative. Demarcation influences both the CO_2 reduction and shadow cost.
- The CO_2 reductions have been calculated separately for each initiative. There may be certain consequential effects from an initiative that are not included in the analysis of another initiative. Caution should therefore be exercised when comparing the shadow costs of various measures and across sectors.

In addition to the uncertainty associated with determining the expected reductions, there is also significant uncertainty linked to determining the socio-economic prices for the various effects included in such an analysis. With regard to the socio-economic energy prices, the same fuel price assumptions have generally been used as were used in the Government's 2003 Climate Strategy.

To give an indication of the significance of central assumptions, Table B2.3 contains a few examples showing how much the shadow price varies in response to potential changes to the key background parameters. For a more complete and systematic presentation of the sensitivity analyses for the individual measures, please refer to "*Energy policy measures in the 1990s: Costs and CO_2 effects*".

TABLE B2.3: SENSITIVITY ANALYSES FOR SELECTED MEASURES – EXAMPLES

Measure	Change in parameter	Result of base calculation Shadow price reduction in 2008-12	Result of sensitivity analysis
Grants to private wind turbines	A discount rate of 3 % instead of 6 % p.a.	3.4 million tonnes CO_2 / year DKK 275/tonne CO_2	- DKK 175/tonne CO_2 (- DKK 100/tonne)
Grants to private wind turbines	Change in the electricity price from 2005 of - DKK 0.02/kWh	3.4 million tonnes CO_2 / year DKK 275/tonne CO_2	- DKK 295/tonne (+ DKK 20/tonne)
Increases to fuel taxes [1]	Demand elasticity halved from -0.6 to -0.3 (passenger vehicles) and -0.2 to -0.1 (trucks)	1.2 million tonnes CO_2 / year DKK 775/tonne CO_2	0.6 million tonnes/year (-0.6 mill. tonnes/year) DKK 575/tonne (- DKK 200/tonne)

[1] The CO_2 reduction has been calculated for all fuel consumption, i.e. fuel consumption for both passenger cars and trucks. However the shadow price has only been calculated for fuel consumption in passenger cars, corresponding to the calculations carried out in connection with the Government's 2003 Climate Strategy. This factor also applies to the sensitivity analysis for "Increases to fuel taxes.

Effects

Estimate of reductions

So as to estimate the effect an initiative has had on greenhouse gas emissions, the change compared to a reference scenario must be assessed. The reference scenario is based on the base projection of CO_2 emissions carried out in connection with the Danish climate strategy from February 2003. As a rule this projection is assumed to reflect the effect of the initiatives analysed. As regards the individual initiatives, how great the increase in emissions would have been if the initiative in question had not been introduced has thus been estimated.

The initiatives have typically been assessed individually, i.e. in some cases the interaction effects between some initiatives have not been taken fully into account. Reductions in energy consumption due to tax increases, for example, can have effect the use of energy production from wind turbines and vice versa. Furthermore please note that all initiatives in the energy area have been calculated based on one and the same reference development (base projection from February 2003). The base projection is characterised by all calculations being based on a world with existing regulation, including e.g. existing taxes and duties. In principle calculations should also take into account the order in which the different initiatives have been – or will be – introduced as each initiative may affect the other initiatives both with regard to effect and costs. This has not been possible to do within the scope of *the Effort Analysis*.

The emission inventory method under the Kyoto Protocol uses the energy *production* or the actual emission of CO_2 in Denmark, as opposed to in the Energy 2000 emission inventory, which is based on CO_2 impacts caused by energy *consumption* in Denmark. This is a crucial difference as regards initiatives that either affect the demand for electricity or the production of environmentally-friendly electricity. Electricity production (and therefore CO_2 emissions) in Denmark is determined by the price development in the electricity market and cannot be controlled directly through national initiatives.

One of the additional requirements of the Kyoto Protocol is that the use of flexible mechanisms has to be supplemental to domestic action. Therefore two estimates of Danish efforts are in principle relevant – one estimate on achieved emission reductions in Denmark compared to the inventory calculations under the Kyoto Protocol, and one estimate of *the total effect* of the Danish efforts under the Kyoto Protocol, regardless of whether an initiative has led to reductions in emission in Denmark or abroad.

With the introduction of the open international electricity market in the late 1990s, it is not a given fact that for example extension of renewable energy will reduce CO_2 emissions from *Danish* electricity producers correspondingly, as it may be an advantage for Danish electricity producers to export electricity instead of limiting their production. To the extent that this is the case, CO_2 emissions will decrease in other countries instead of in Denmark. This is a central issue of concern as regards calculating how great the effect of initiatives will be when compared to the base projections.

The Danish electricity production in the Northern European electricity market, and the effect of initiatives for limiting the need for fossil electricity production is – and is expected to be – partially countered by an increase in exports of fossil electricity production from Denmark. Estimation of the size of this effect is subject to extreme uncertainty. A rudimentary assumption is that, 50% of the effects of the electricity sector initiatives will be offset by electricity exports. This estimate is subject to significant uncertainty and depends, for example, on the future expansion of production capacity in the Scandinavian countries (cf. the background report, Energy policy initiatives in the 1990's: Costs and CO_2 effects (Danish Energy Authority, 2005).

Emission reductions

The estimated reductions for measures for the year 2001 and the annual average in the period 2008-12 is presented in Table B2.4 below. Please note that CO_2 reductions in the period 2008-2012 are expressed both from an energy consumption and energy production angle. The energy consumption angle is based on the assumption that all CO_2 reductions will be allotted to Denmark, while reductions based on the energy production angle alone concern changes in actual emissions from Danish areas.

TABLE B2.4 OVERVIEW OF REDUCTION CONTRIBUTIONS OF MEASURES IN 2001 AND EXPECTED CONTRIBUTIONS AS ANNUAL AVERAGE REDUCTION IN THE PERIOD 2008-2012 (MILLION TONNES CO_2 EQUIVALENTS)

Sector	**Measure**	**CO_2 reduc. in 2001 Million tonnes CO_2**	**Av. annual CO_2 reduc. for 2008-2012 - Million tonnes CO_2**	
			Energy consumption angle	**Energy production angle**
Energy	Grants to private wind turbines	2.6	3.4	1.7
	Electricity generation plant expansion using wind turbines	0.4	0.9	0.5
	Expansion in decentralised cogeneration of heating and power	2.2	2.1	0.4
	Agreement on use of biomass for electricity production	0.2	1.1	1.1
	Grants for energy savings in businesses	1.1	0.9	0.9
	Grant to cover CO_2 tax (agreement scheme)	0.3	0.6	0.6
	Grant for conversion of old dwellings to cogenerated heat and power	0.2	0.2	0.2
	Grant to promote connection to coal-fired CHP	0.1	0.1	0.1
	Grants for renewable energy	0.1	0.1	0.1
	Building labelling	0.2	0.4	0.4
	Changes to taxes on energy products[2]	1.5	1.5	1.0
	Further energy measures	4.6	4.6	4.0
	Total energy	**13.5**	**16.0**	**11.0**
Industry	Taxes on and regulation of use of industrial gases	0.0	0.4	0.4
	Total industry	**0.0**	**0.4**	**0.4**
Transport	Increased fuel taxes[2]	1.2	1.2	1.2
	Diverse measure to improve energy efficiency in Danish vehicles[1]	0.2	0.6	0.6
	Total transport	**1.3**	**1.7**	**1.7**
Agriculture	Action plans for agriculture[3]	1.6	1.9	1.9
	Total agriculture	**1.6**	**1.9**	**1.9**
Waste	Collection of methane from landfills	0.2	0.2	0.2
	Ban on landfilling of waste suitable for incineration	0.0	0.3	0.3
	Total waste	**0.2**	**0.5**	**0.5**
All	**Total**	**16.7**	**20.6**	**15.6**

[1] In addition to the voluntary agreement with the automobile industry, measure include the green owner tax, information campaigns, energy labelling etc.

[2] Reductions as a consequence of the increased taxes on both energy products and fuel are estimated for 2001. Reductions for 2008-12 are based on the assumption that taxes and fuel prices actually remain unchanged and that demands do not change.
[3] Includes the NPO action plan from 1990, Action Plan for the Aquatic Environment I from 1987, Action plan for sustainable agriculture from 1991 and Action Plan for the Aquatic Environment II from 1998. See NERI, 2003 for a more detailed description of the action plans and their effects.

Table B2.4 includes a row with further energy measures.

Table B2.5 includes a number of initiatives without cost estimates that also significantly affect Denmark's CO_2 emissions. These measures have not been studied in more detail in connection with *the Effort Analysis* - either because their overall objective has not been to reduce CO_2 emissions or because insufficient data were available for a proper assessment of the measure's effects within the budget framework. In another context how much these additional measures would contribute to CO_2 reductions in 2008-12 has been assessed. The effect 2008-12 is estimated on the basis of energy statistics from 2001 combined with assumptions used in calculations for the Climate Strategy. The results of this assessment can be seen in Table B2.5.

Table B2.5 Overview of the estimate of CO_2 reductions from further energy measures

Measure[1]	**Estimate of CO_2 reductions in 2008-12 (million tonnes CO_2)**	**Estimate of CO_2 reductions in 2008-12 from energy policy of 1990s (million tonnes CO_2)**
Central CHP (coal-CHP) as replacement for individual oil-fired heating	1.8	0
Conversion from central electricity production from coal to natural gas	1.4	1.4
Establishment of other decentralised CHP that are not included under the measure Expansion in decentralised cogeneration of heating and power (including industrial CHP, biogas CHP and waste CHP)[2]	2.7	1.2
Separate district heating production from biomass	0.7	0.7
Utilisation of industrial surplus heat for district heating	0.3	0.1
Separate district heating production from waste	0.4	0
Natural gas supply for heating of individual buildings	1.2	0.6
Natural gas supply for industrial processes	1.1	0.6
Total	**9.6**	**4.6**

[1] It has been assumed that these measures are primarily fully implemented and that 2001 reductions correspond to the reduction stated for 2008-12.
[2] This measure entails an increase in emissions of the greenhouse gas methane. In the estimate of CO_2 reductions for 2008-12, an increase in methane corresponding to 0.3 million tonnes CO_2 equivalents has been included. The estimate of CO_2 reductions in 2008-12 from the energy policy of the 1990s includes an increase in methane corresponding to 0.1 million tonnes CO_2 equivalents.

The measures analysed are assessed to have reduced approx. 16.7 million tonnes CO_2 in total in 2001. Furthermore it is assessed that Denmark – seen from the so-called energy production angle – would have emitted approx. 15.6 million tonnes CO_2 more on average per year in the period 2008-12, is the measures analysed had not been implemented. Moreover the measures analysed will lead to further reductions in 2008-12 of approx. 5.0 million tonnes CO_2 per year, however this will be countered by the emissions from the increased electricity exports made possible by the measures implemented. The total emission of CO_2 seen from the so-called energy consumption angle would thus have been approx. 20.6 million tonnes greater without the measures.

Annex B3 The 2013 Analysis of the Effect of Selected Measures

In December 2013 the Ministry of Climate, Energy and Building published a paper in response to recommendations in a report published by the National Audit Office in October 2012. This paper contains an evaluation of the effects of climate change mitigation measures selected by the National Audit Office and is reproduced in English in this Annex. Due to new knowledge and new decisions by the government a paper with the pending estimate of the Green Growth Agreement in agriculture was compiled by the Danish Energy Agency and sent to the National Audit Office in 2014. The National Audit Office included this in its final audit report[1]. The additional estimate is included in Table B3.13 below. As shown in Table B3.14 it was not possible to include an estimate of the related costs in the 2014 paper.

Evaluation of the effects of measures implemented to meet the Kyoto commitment for 2008-12.

1 Introduction

In October 2012 the National Audit Office submitted a report on Denmark's reduction of CO_2 emissions. In this context, the National Audit Office highlighted the impact assessment of national measures to fulfil Denmark's Kyoto commitment and included a note that the Ministry of Climate, Energy and Building had not followed up the assessment of the CO_2 - reducing effect of national reduction measures, including the reductions in individual actions had contributed. Against this background, the National Audit Office found that:

"The Ministry of Climate, Energy and Building Department should calculate the Danish State's total costs of meeting the Kyoto target, and within the limits of its capabilities the Ministry should determine the impact of the national reduction measures. This allows the Ministry to ensure parliament the best possible basis when strategies for future reductions in CO_2 emissions are to be determined."

Specifically, the National Audit Office found that the Ministry should assess the impact of the nine national reduction measures set out in Table B3.1 below, on an updated basis.

In his reply of 7 December 2012, the Minister for Climate, Energy and Building noted that the Ministry of Climate, Energy and Building would initiate a comprehensive assessment of the effects of these reduction measures and present the results during 2013. This paper presents the results.

The assessment of the nine measures focuses on both the effect of reductions in 2008-12 non-ETS emissions and the effect on governmental costs. For tax measures, the impact assessment was carried out by the Ministry of Taxation. With regard to the nitrogen effects of the Green Growth agreement, the Ministry of Food, Agriculture and Fisheries announced that an updated assessment is awaiting new figures from DCA / DCE. When the nitrogen effect has been calculated, the climate impact of the Green Growth initiative will be calculated, and an updated assessment will be forwarded.

Other initiatives are assessed by the DEA.

The assessment of individual national efforts is supplemented initially by an updated status of Denmark's use of carbon credits from projects abroad in order to assess the overall state spending on meeting the Kyoto target.

[1] http://www.rigsrevisionen.dk/media/2020369/701-15.pdf

TABLE B3.1: NATIONAL REDUCTION INITIATIVES, WHERE THERE IS AN UPDATED IMPACT ASSESSMENT

	Originally expected non-ETS GHG reduction. Annual output in 2008-12 in million tonnes CO_2 equivalents.
1 Heat pumps Replacing oil burners with heat pumps. Awareness campaigns , labeling of efficient pumps , limited subsidies , etc.	0.03
2 Biogas Subsidy for biogas plants when biogas is used with natural gas	Unknown reduction
3 Biofuels Biofuels for blending into gasoline and diesel	0.29
4 Agriculture A number of initiatives on energy, nature and the environment in the Green Growth Agreement in 2009 , including the reduction of nitrogen emissions to the aquatic environment and permanent spraying, fertilizer and crop-free zones	0.24
5 Electric cars Funds for pilot scheme for electric vehicles	Unknown reduction
6 Natural gas -fired power plants Reduction of methane from gas engines through implementation of a methane tax equal, in terms of CO_2 equivalents, to the CO_2 tax.	0.01
7 Energy and CO_2 taxes Increase in energy and CO_2 taxes in the non-ETS sector	0.58
8 Energy savings and efficiency improvements Increased demands for energy savings in buildings and electricity companies	0.13
9 CO_2 tax on plastic and waste Introduction of the same tax on plastic as tax on fossil fuels	Unknown reduction

Note: It should be noted that the initially expected effect of increased demands for energy savings in buildings and electricity companies (item 8) was 0.13 million tonnes and not 0.3 million tonnes. Due to an unfortunate typing error the latter figure was reported by the DEA to the National Audit Office and therefore included in the corresponding table in the National Audit Office report.

2 Overview of JI/CDM carbon credit costs for closing the gap in achieving compliance with the Kyoto Protocol.

The total numbers of expected credits constitute 15.8 million cf. Table B3.2 below. The number of completed credits is 14.8 million. Outstanding expected delivery represents 1.0 million, which essentially consists of CDM credits. CDM credits are, compared to JI-credits, subject to a time - prolonging UN process before the issuance of the credits is possible, which must happen before 2015.

Compared to previous expectation, JI projects have generally provided a higher proportion of the total estimated amount of credits, while CDM-projects have provided a declining rate compared to previous expectations.

TABLE B3.2: SUMMARY OF CREDITS DELIVERED FOR KYOTO COMPLIANCE, COMPILED OCTOBER 2013.

The period 2008-2012	Delivered credits Million	Number of expected credits Million	Pending deliveries Million
CDM credits	3.2	3.9	0.7
JI credits	10.4	10.4	0
Credits from funds	1.2	1.5	0.3
Total	**14.8**	**15.8**	**1.0**

There are no pending JI credits. The pending CDM credits will be delivered later in 2013 and 2014. Fund Credits are subject to the same UN procedure as the CDM credits as the underlying projects are CDM projects.

Total costs and unit costs are shown in Table B3.3 for each type of credit. The costs have decreased compared to previous years. The lower costs are due to withdrawal of financial risk coverage on the individual project contracts and cancellation of contracts which under deliver. The cancellation is realized gradually as projects are completed.

No additional significant decrease in the expected total unit costs is forecast, as the expected non-cancellation has been included.

TABLE B3.3: SUMMARY OF THE EXPECTED COSTS FOR THE ENTIRE PERIOD 2008-12. COMPILED OCTOBER 2013.

Period 2008-2012	Direct credit purchases DKK million.	Administrative costs DKK million	Project Development DKK million	Total government spending DKK million.	Expected costs DKK per credit
CDM credits	327.7	22.9	23.1	373.7	96
JI credits	598.5	61.0	61.4	720.9	70
Credits from funds	138.3	9.0	0	177.3	97
Total	**1,064.5**	**92.9**	**84.5**	**1,241.9**	**79**

As shown in Table B3.3, total government spending to purchase credits to meet the Kyoto commitment is expected to be DKK 1241.9 million in total over the period, equivalent to an average annual cost over 5 years (Kyoto period 2008-12) of approx. DKK 250 million.

The overall effect is expected to be 15.8 million tonnes of CO_2, equivalent to an average annual impact over 5 years (the Kyoto period 2008-12) of 3.16 million tonnes of CO_2.

3. Assessment of national actions

Item 1 Heat pumps

The initiative is to promote the sales of heat pumps in order to reduce oil consumption and reduce CO_2 emissions. Specifically, in the Energy Agreement of 21 February 2008, DKK 30 million was allocated over two years for public awareness campaigns, labelling of efficient pumps, limited subsidies etc. targeting heat consumers outside the areas supplied by district heating.

There is not considered to be a loss of revenue associated with the operation. Via electricity taxes, heat pumps provide virtually the same revenue as the oil-fired boilers they replace. Government spending is limited to the allocated DKK 30 million.

The funds have been used within the following broad categories:

- Promotions: approx. 7% of the funds,
- Labelling: 23% of the funds, and
- Grants etc.: approx. 70% of the funds.

Sales figures from the heat pump industry show that sales of heat pumps from 2008 onwards were at a significantly higher level than in the past, cf. sales statistics shown in Table B3.4 for the two types of heat pumps that efforts have focused on.

TABLE B3.4: HEAT PUMPS SOLD BY MEMBERS OF THE HEAT PUMP ASSOCIATION (ROUNDED TO THE NEAREST 100)

	2007	2008	2009	2010	2011	2012
Liquid-water (geothermal heating)	1800	4100	3500	4100	4200	3100
Air –water	400	1400	1100	1300	1600	2100

It should be noted that the sales statistics do not cover the entire market, as heat pumps are also sold by importers / manufacturers who are not members of manufacturers' association. However, for geothermal heating and air-water it is estimated that the registrations cover the vast majority of the market (more than 90%).

How much of the increase from 2007 is due to the subsidy and the extra effort is very uncertain. In the following a campaign effect as shown in Table B3.5 is assumed. This is an experience-based estimate, which is supported by the jump in level of heat pumps sold from 2007 to 2008, but it is still subject to considerable uncertainty.

TABLE B3.5: ASSUMED CAMPAIGN EFFECT.

	2008	2009	2010	2011	2012
Campaign effect of additional sales from 2007	40%	35%	30%	20%	10%

Hence a total output of 4100 replacements was achieved, see Table B3.6. Each pump is assumed to replace about 100 GJ of oil annually. This corresponds to a CO_2 output of 0.03 million tonnes in 2012 at full implementation. The average annual output for the period 2008-2012 is estimated to be in the range of 0.02 million tonnes/year.

TABLE B3.6: ESTIMATED IMPACT OF FUNDING FOR THE PROMOTION OF HEAT PUMPS (1 OIL BURNER ~ 100GJ OIL / YEAR)

	2008	2009	2010	2011	2012	Average 2008-12
Cumulative effect of initiative [Number of oil burners replaced]	1300	2200	3100	3800	4100	
CO_2 reduction [million . tonnes]	0.010	0.016	0.023	0.028	0.031	0.02

Overall, the fact remains that there is considerable uncertainty in estimating the effect of market - supporting activities.

The initial assessment of the effect was 0.03 million tonnes per year in 2008-12. This was estimated by a recalculation to be correct in the long-term. However, in the period 2008-12 the effect is estimated to have been a little lower, corresponding to approx. 0.02 million tonnes of CO_2.

Item 2 Biogas

The Energy Agreement of 21 February 2008 included an increase in the electricity settlement price when biogas is used in conjunction with natural gas of DKK 0.745/kWh or as a fixed price supplement of DKK 0.405/kWh. The electricity settlement price and the price supplement will be adjusted by 60% of the increase in the consumer net-price index.

The increase in support for biogas in the Energy Agreement was originally expected to cause an increase in gas production from biogas as shown at the top of Table B3.7.

TABLE B3.7. EFFECT OF INCREASED SUPPORT FOR BIOGAS PLANTS.

Year	2007	2008	2009	2010	2011	2012
Expected energy production (PJ)	3.91	4.53	5.07	5.75	6.52	7.42
Actual energy production from biogas (PJ)	3.91	3.93	4.17	4.28	4.11	
Actual reduction in greenhouse gases from manure due to increased biogas production (million tonnes of CO_2 equivalent)		0.002	0.019	0.027	0.018	0.018

The initiative has not resulted in the expected increase in biogas production because of other barriers to setting up biogas plants (location of construction, financing, marketing, etc.). The actual development is shown in Table B3.7. An increase of 66% in biogas production from 2007 to 2011 was expected, but only an increase of 5 % was realised.

The reduction of greenhouse gas emissions from the actual development can be seen in Table B3.7.

The effect is calculated by the DCE on the basis of figures for the actual biogas production. No figures are available for 2012 yet. The effect in 2012 is cautiously assumed to be the same as in 2011.

The average CO_2 reduction in 2008-12 is thus 0.017 million tonnes.

The support for biogas is funded via the PSO revenues: Therefore there is no direct effect on government finances. The tax revenue loss associated with the displacement of taxed fossil fuels is estimated to be less than DKK 10 million per year on average for the period 2008-12.

<u>Item 3 Incorporation Requirements for Biofuels :</u>
In the Energy Agreement of 21 February 2008 it was agreed that the share of biofuels etc. in ground transportation should be at 5.75% by 2010 and 10% by 2020. This is similar to the EU goals.

The specific instrument is a statutory blending requirement for the oil companies, and the initial impact assessment is a CO_2 reduction of 0.29 million tonnes on average per year in 2008-12.

In 2009, the blending requirement was implemented by law. The requirement was phased in gradually with 0.75% biofuel in 2010, 3.3% in 2011 and 5.75% in 2012. Subsequent verification of compliance with the blending requirement proved that it was difficult for oil companies to fulfill the requirement in 2010. There was therefore an amendment to the Statutory Order regarding biofuels stating companies should just have a total of 2.025% on average per year for the 2 years, 2010 and 2011,.

The direct CO_2 reductions follow from replacing fossil fuels with biofuels. However, there is also a secondary effect due to the higher price of biofuels, which leads to lower sales. In addition to the regular price effect, the border trade will be reinforced, which reduces consumption further.

Below is the updated estimate of CO_2 displacement in the period 2010 to 2012 including the secondary effect from increased prices. For 2010 to 2011 the estimates are based on statistics, while the estimate for 2012 is based on the energy projection from 2012. The CO_2 effect is calculated on the basis of consumption of bioethanol and biodiesel respectively, replacing petrol and diesel respectively. For petrol CO_2 emissions are reduced by 73 kg/GJ and for diesel by 74 kg / GJ when these fuels are replaced with biofuels.

TABLE B3.8 BIOFUEL USE AND CO_2 DISPLACEMENT.

	2010	**2011**	**2012**	Total	Average 08-12
Bioethanol (consumption in TJ)	1,118	2,062	1,993		
Biodiesel (consumption in TJ)	16	3,492	7,019		
CO_2 reduction (direct) (million tonnes)	0.08	0.42	0.62	1.12	0.22
CO_2 reduction incl. secondary effects (million tonnes)	0.11	0.54	0.81	1.46	0.29

The direct effects are calculated savings directly related to the sale of biofuels, while the secondary effects are calculated effects based on assumptions regarding border trade etc. The secondary effects are thus subject to considerable uncertainty. When the secondary effects are included, the total CO_2 effect is largely as expected.

Financial consequences for the state.
With no CO_2 tax on biofuels, there has been an immediate loss of revenue of approx. DKK 30 million per year on average in 2008-12.

In addition, there has been a derivative loss of revenue resulting from the effect of the price of fuel rises and consumption falls, including through increased cross-border trade to the detriment of Denmark. These effects are associated with considerable uncertainty. The total tax revenue loss is therefore estimated to be up to DKK 250 million per year, although with great uncertainty.

Item 4 Agriculture

The Ministry for Food, Agriculture and Fisheries stated in 2013 that an updated assessment was awaiting new figures from DCA / DCE and that an estimate of the climate impact of the Green Growth Plan from 2009 will be calculated as soon as this plan's effect on nitrogen leakage to the water environment has been calculated. The pending estimate was calculated in 2014 and is now included in Table B3.13.

Item 5 Electric cars

An element in the Energy Agreement of 21 February 2008 was a fund of DKK 30 million over 5 years (2008-12) for a pilot scheme for electric cars.

The objective was to provide grants for projects designed to implement testing and trial operation of a fleet of electric cars for a longer period in order gather experience on technical, organizational, economic and environmental conditions. The scheme has not been directed at short term CO_2 reductions, and no reduction targets have been set for the scheme.

There is a limited effect on the number of electric vehicles, corresponding to CO_2 reduction of around 0.002 million tonnes in 2012 and less in the years before.

Item 6 Natural gas -fired power plants. Reduction of methane from gas engines through implementation of a methane tax equal, in terms of CO_2 equivalents, to the CO_2 tax.

The measure was implemented by Act No. 722 of 25 June 2010 and entered into force on 1 January 2011.

As a result of the tax increase behavioral changes are expected through changing from motor operation to boiler operation and establishing treatment measures. Consumption is also expected to fall as the price of heat will increase. These behavioral changes will result in falls in the emissions of unburned methane from power stations. In addition, CO_2 emissions will fall and consumption of natural gas will fall.

Emissions of greenhouse gases outside the ETS sector are estimated to decrease by approx. 0.06 million tonnes of CO_2 equivalents in the short term of which 50% constitutes a decrease in methane emissions. A decline of 0.06 million tonnes in 2 out of 5 years corresponds to an average annual reduction effect of approximately 0.02 million tonnes per year in 2008-12.

Taxes on greenhouse gases other than CO_2 are expected to have an immediate long-lasting effect of DKK 25 million (2009 prices). After the effects on other accounts (VAT) and after other rebound effects the lasting effect is estimated at 20 million (2009 prices). After the rebound effects and change in behavior, the lasting effect is estimated at DKK 5 million (2009 prices). In 2011, additional revenue of DKK 18 million on the CO_2 tax account was estimated as a consequence of the draft Bill. At the same time, there was an expected loss of revenue on natural gas of approx. DKK 10 million in 2011.

All in all, total revenues on the CO_2 tax account in 2011 were estimated at DKK 5,900 million. The income for 2011 was DKK 5,897 million. However, other draft bills with effects on the revenues on the CO_2 account from 2011have also been adopted. This makes it difficult to distinguish the effect of the individual changes.

Item 7 Energy and CO_2 taxes. Increase in energy and CO_2 taxes in the non-ETS sectors.

The measure was implemented by Act No. 528 of 17 June 2008 and entered into force on 1 January 2010.

The total estimate of the environmental impact of an increase in the CO_2 tax on fuels from DKK 3-90 to 150 per tonnes of CO_2 is an approx. 0.69 million tonnes per year decrease in CO_2 emissions.

A decline of 0.69 million tonnes CO_2 for three out of five years corresponds to an average annual reduction of approximately 0.41 million tonnes CO_2 per year in 2008-12. Originally, entry into force was expected one year earlier with a correspondingly greater effect in the Kyoto Protocol's first commitment period.

The expected effect in 2010 on the CO_2 tax account, with adjustment for accruals, was expected to be at DKK 779 million (2010 prices) as a result of the draft legislation on the CO_2 tax. However, the total tax package (as part of the Energy Agreement of 2008) including introduction of a NOx tax from 1 January 2010 was revenue-neutral.

The final estimate of the CO_2 tax account in 2010 was DKK 6,225 million. Revenues on the CO_2 tax account were DKK 5,757 million in 2010.

As noted by the Ministry of Taxation, several other changes in the law have been made and several other factors have changed, including economic conditions affecting the CO_2 tax account. It is therefore difficult to assess how individual regulatory changes contribute to the total revenues in the account. From the available data, the Ministry of Taxation finds that there is no basis for evaluating the annual effect differently than originally expected.

Item 8 Energy savings and efficiency improvements
The effort under this item consists of two measures:

> *8a• Increase in energy companies saving obligations:* Some energy companies are obliged to contribute to energy savings. The requirement for the amount of annual energy savings that companies should contribute to has increased from 2.95 PJ per year up to 2009 to 6.10 PJ per year from 2010.
>
> *8b• Tightening of the building energy requirements:* The building regulations include a variety of energy-standard requirements for new buildings. One of these requirements is measurement of the building's heating requirements etc. In 2011 the requirement was changed from approximately 85.7 kWh per m^2 per year to 63.5 kWh per m^2 per year (for housing).

The calculations suggest an annual reduction in CO_2 emissions of 0.06 million tonnes of CO_2 per year on average 2008-2012. Correspondingly, the impact on the state budget is approx. DKK 50 million on average over the same period. The effect on the budget stems from reduced revenues from energy taxes and CO_2 taxes.

8a The energy companies saving obligations
A number of energy companies are required to contribute to energy savings up to a certain total amount of energy. Energy companies can, for example, grant subsidies or give advice to a company that wants to make an investment that reduces energy consumption. Energy companies must contribute to the amount of energy savings determined, and energy savings should be sought with as little cost as possible. The costs involved are covered by the energy companies through consumer tariffs.

Energy companies' costs due to energy saving obligations do not affect the state budget.

When energy companies contribute to energy savings, it is unknown whether the specific energy saving would have been undertaken anyway without the energy companies' involvement. Therefore, the effect cannot simply be equal to the fixed amount of energy savings imposed on the companies.

Calculations are based on data from energy companies that provide detailed information on individual energy savings to the DEA. Calculations also include an estimate of the proportion of the savings that result from energy companies' involvement[i].

A study from 2012 suggests that 46% of the energy savings in the business sector are due to the energy companies' participation, while 20% of the energy savings in the household sector are due to the energy companies' participation.

These factors are methodologically very difficult to assess and therefore very uncertain.

The total requirements for energy companies were 2.95 PJ per year until 2009 and 6.10 PJ per year starting in 2010. As of 2010, additional types of energy savings are included - including efficiency improvements in energy companies' own installations (e.g. grid).

In practice, the energy companies exceeded their obligations. Instead of calculating the effect based on the modified obligation (from 2.95 PJ/year to 6.1 PJ/year) the effect is calculated on the basis of actual energy savings that companies have generated. For the years 2008 and 2009 the energy companies contributed to savings totaling 3.8 PJ per year on average over the two years. The corresponding figure for 2010-2012 was 7.0 PJ per year. So after the tightening of the requirement, the energy-companies have contributed an additional 3.2 PJ per year of energy savings.

The distribution of the change in the energy savings that energy companies have contributed to is shown in Table B3.9.

TABLE B3.9 INCREASE IN THE LEVEL OF ENERGY SAVINGS THAT ENERGY COMPANIES HAVE GENERATED SHOWN AS CHANGE IN ANNUAL AVERAGE FROM THE PERIOD 2008-2009 TO 2010-2012, TJ PER YEAR.

	District Heating	**Electricity**	**Other**	**Natural-Gas**	**Oil**	**Total**
Households	282	-152	-40	155	39	284
Public sector	4	79	7	49	36	174
Business	437	267	-8	751	819	2266
Supply	197	255	8	56	19	536
Total	**920**	**449**	**-33**	**1010**	**913**	**3259**

Source: DEA based on reports from energy companies.
Note: Negative figures, such as electricity in households, are due to increased prioritization of the business sector. "Other" primarily covers biomass, but also coal, etc.

With these assumptions, estimated CO_2 reductions outside the ETS sector (i.e. excluding electricity and district heating) as a result of the energy companies' savings efforts are on average for 2008-2012 63,216 tonnes per year; equivalent to approx. 0.06 million tonnes. The estimate is based on the assumptions described above for the effect of the energy companies' efforts outside the ETS sector and CO_2 emission factors for oil and natural gas.

Effects of companies' energy-savings obligations on state finances.
The companies' efforts are financed through the price of electricity and thus have no direct impact on the state budget.

Energy savings cause lower revenues from taxes on energy.

On average, over the five years from 2008 to 2012, the reduction in tax revenue is estimated at DKK 39 million per year.

8b Strengthening of the Building Regulation
The Building Regulation covers a wide range of requirements for the energy standard of new buildings. For example there are requirements for the energy properties of individual building components– e.g. through windows - but there is also a requirement for the building's total energy consumption. "Component Requirements" and the requirements for the total building fit roughly together, so figures below are calculated from the tightening of the overall requirements shown in Table B3.10.

In the calculations of the effect of the tightening of the Building Regulations, it is assumed that the actual energy consumption drop corresponds to the tightening of the Building Regulations. It is not certain that this is the case. It could be possible, for example, that energy consumption of buildings would fall alone due to market developments over time and it is possible that actual energy consumption will not fall in line with the decrease in the amount of energy that buildings are designed to need.

TABLE B3.10 STRENGTHENING IN THE ENERGY REQUIREMENTS OF THE BUILDING REGULATION

		Space requirements	Fixed increase	Assumed average size	Calculated requirements	Reduction
		kWh per m^2 per year	kWh per year	m^2	kWh per m^2 per year	kWh per m^2 per year
Up to and including 2010	Housing	70	2200	150	84.7	
	Offices	95	2200	1000	97.2	
From 2011	Housing	52.5	1650	150	63.5	21
	Offices	71.3	1650	1000	73.0	24.25

Source: Bygningsreglementet.dk .

Table B3.11 shows the distribution of new construction by the types of heating.

TABLE B3.11 DISTRIBUTION OF THE AREA OF NEW CONSTRUCTION IN THE FORM OF HEATING, THE AVERAGE FOR 2011 AND 2012, PERCENT

	Other	District Heating	Natural Gas	Oil	Heat Pumps	Total
Residential	3	60	16	2	19	100
Office buildings	17	62	17	1	3	100

Source: BBR, own calculations.

The effect of the tightening of building regulations for new construction obviously depends on the volume of new construction, as shown in Table B3.12

TABLE B3.12 THE VOLUME OF NEW CONSTRUCTION 2011-2012, '000 M^2.

	2011	2012
Housing	2019	1303
Offices	1222	804

Source: Statistics Denmark, Statistics Bank.

The effects on energy consumption and CO_2 emissions outside the ETS sector are calculated in the new building scale (Table B3.12) times the tightening of building regulations (Table C.10) for the relevant heating methods (Table B3.11) . For CO_2 emissions this is multiplied further by CO_2 coefficients, and the results are on average over the five years from 2008 to 2012, that the emissions have been reduced by 1,292 tonnes (or 0.001 million tonnes).

The small effect should be seen in light of the fact that this is a long-term measure that will have a significantly greater effect in the long term.

Financial effects for the state
The calculated effect of reducing tax revenue by tightening building regulations outside the ETS sector is estimated at DKK 12.4 million per year on average over the five years from 2008 to 2012.

<u>Item 9 CO_2 tax on plastic and waste. Introduction of the same tax on plastic as the tax on fossil fuels.</u>
The measure was implemented by Act No. 461 of 12 June 2009 and entered into force on 1 January 2010.

Since it is expected that the introduction of the tax would lead to increased recycling of waste with high energy , there will be an environmental benefit . This is because the CO_2 is emitted during burning of waste containing plastic. Waste incineration plants are outside the ETS sector in 2008-2012. Under the previous rules , before the law came into force , there was a significantly higher tax burden on waste incinerated in central CHP plants and in industrial process plants (subject to CO_2 allowances) than in the general waste incinerators. With this Act, the tax-based incentives were harmonized. Therefore, less waste will be incinerated in general installations outside the ETS sector. A part of it will be recycled, while another part will be burned by the ETS operators. Therefore, CO_2 emissions outside the ETS sector fall as a result of the measure. Since several laws that affect the CO_2 tax account were passed in 2010, it is difficult to assess the impact of each measure. The same applies to the effect on total CO_2 emissions.

4 Summary

In Table B3.13 below the updated *CO_2 impact* calculation is summarised and compared with the initial assessment.

TABLE B3.13 NATIONAL REDUCTION MEASURES. ORIGINAL AND UPDATED IMPACT ASSESSMENTS. (EXPECTED NON- ETS CO_2 REDUCTION. ANNUAL AVERAGE REDUCTION IN 2008-12 IN MILLION TONNES CO_2 EQUIVALENTS)).

	Original assessment	**Updated assessment**
1. Heat pumps Replacing the oil burner with heat pumps. Awareness campaigns , labeling of efficient pumps , limited subsidies , etc.	0.03	0.02
2. Biogas Subsidy for biogas plants when biogas is used with natural gas	Unknown reduction	0.017
3. Biofuels Biofuels for blending into gasoline and diesel	0.29	0.29
4. Agriculture A number of initiatives on energy, nature and the environment in Green Growth Agreement in 2009, including the reduction of nitrogen emissions to the aquatic environment and permanent spraying, fertilizer-free and crop-free zones	0.24	0.24-0.26
5. Electric cars Funds for pilot scheme for electric vehicles	Unknown reduction	<0.002
6. Natural gas -fired power plants Reduction of methane from gas engines on introduction of tax equivalent to the CO_2 tax.	0.01	0.02
7. Energy and CO_2 taxes Increase in energy and CO_2 taxes in the non-ETS sector	0.58	0.41
8. Energy savings and efficiency improvements Increased demands for energy savings in buildings and electricity companies	0.13	0.06
9. CO_2 tax on plastic and waste Introduction of the same tax on plastic as on fossil fuels Unknown Reduction	Unknown reduction	-
Total	**1.28**	**1.06-1.08**

It appears that CO_2 effects are generally considered to be slightly less than originally expected. The difference is not significant, the uncertainty considered. An updated impact assessment of the Green Growth agreement is pending. The effect of the Green Growth agreement assumed until now is therefore included in the total effect of 1.06 million tonnes shown in Table B3.13.

It may be added that the actual trend in total emissions - regardless of the minor to evaluate the efficacy of the individual instruments - has led to the Kyoto target more than met.

The fiscal costs are summarised in Table B3.14, incl. the cost of credits. All figures for the fiscal costs - like CO_2 effects – are calculated annual averages in 2008-12.

As can be seen, the direct costs for the state budget (excluding related revenue losses) to meet the Kyoto commitment are estimated at DKK 265 million per year on average in the period 2008-12.

The related revenue loss amounts to DKK 310 million per year on average in the period 2008-12, but with great uncertainty, especially regarding the effect of cross-border trade from the biofuel measure, which accounts for DKK 250 million out of the DKK 310 million in total revenue losses.

TABLE B3.14 STATE FINANCE COSTS IN DKK MILLION AS ANNUAL AVERAGE 2008-12

	State Expenditure budget **Annual average 2008-12**	**State Losses on Tax Budget** **Annual average 2008-12**
Heat pumps Replacing the oil burner with heat pumps. Awareness campaigns , labeling of efficient pumps , limited subsidies , etc.	6	0
Biogas Subsidy for biogas plants when biogas is used with natural gas	0	10
Biofuels Biofuels for blending into gasoline and diesel	0	Up to 250
Agriculture A number of initiatives on energy, nature and the environment in Green Growth Agreement in 2009 , including the reduction of nitrogen emissions to the aquatic environment and permanent spraying, fertiliser-free and crop-free zones and afforestation*	It is not possible to isolate the cost of greenhouse gas reductions	It is not possible to isolate the cost of greenhouse gas reductions
Electric cars Funds for pilot scheme for electric cars	6	0
Natural gas -fired power plants Reduction of methane from gas engines through implementation of a methane tax equal, in terms of CO_2 equivalents, to the CO_2 tax	-	-
Energy and CO_2 taxes Increase in energy and CO_2 taxes in the non-ETS sector	-	-
Energy savings and efficiency improvements Increased demands for energy savings in buildings and electricity companies	0	50
CO_2 tax on plastic and waste Introduction of the same tax on plastic as on fossil fuels	-	-
Credits The state JI and CDM programme	253	
Total	**265**	**Up to 310**

* It is not possible to isolate the cost of greenhouse gas reductions from the Green Growth Agreement and the afforestation efforts. Only a smaller and unspecified share of the cost of 280 million DKK per year is attributable to the reduction of Denmark's greenhouse gas emissions.

[i] EA Energianalyse, Viegand & Maagøe og Niras (2012): "Energiselskabernes energispareindsats" (in Danish), see http://www.ea-energianalyse.dk/reports/1161_evaluering_af_energiselskabernes_spareaktiviteter_bilag.pdf

Annex B4 The 2017 Analysis of CO_2-reduction effects of renewable energy measures and energy efficiency measures

In January 2016 estimates of the total effect of the group of policies and measures that promote the use of renewable energy (RE-PAMs) and of the total effect of the group of policies and measures that promote energy efficiency (EE-PAMs) were reported in Denmark's Second Biennial Report (BR2) under the UNFCCC.

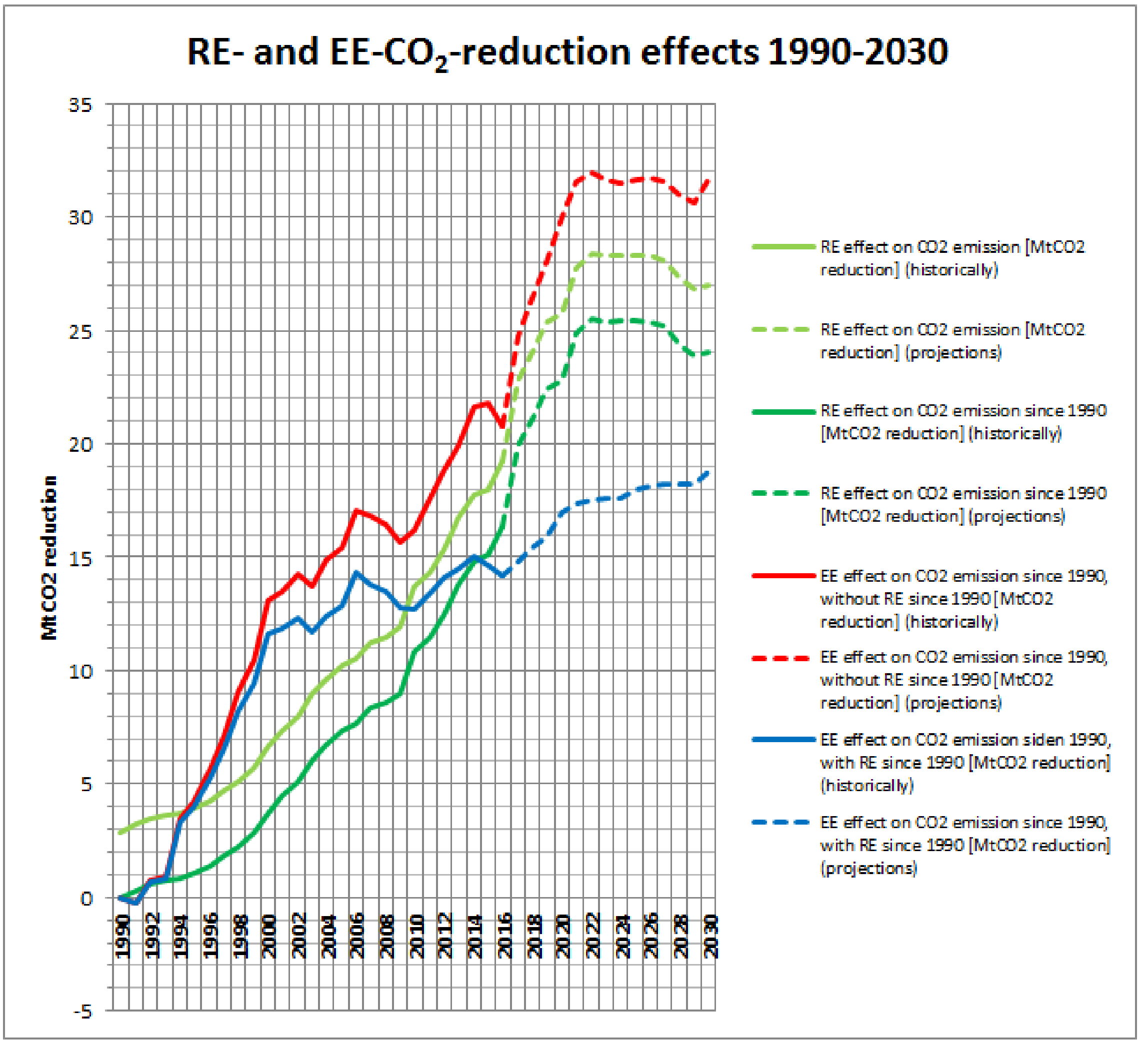
Based on the most recent energy statistics (1990-2016) and the projection from March 2017 (Energy Outlook 2017) these estimates have been updated for NC7/BR3. This annex includes a brief description of the methodologies used and a graphic presentation of the results for the period 1990-2035, where the results for 1990-2016 are so-called ex-post estimates and the results for 2017-2035 are ex-ante estimates.

Total effect of RE-PAMs

The total CO_2 emission reduction effects of RE-PAMs have been estimated using the methodology to be used under EU Renewable Energy Directive (RED). In December 2017 Denmark reported estimates for 2015 and 2016 to the EU in accordance with the RED (http://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports). The methodology used with energy statistics for 2015 and 2016 has been applied to annual energy statistics back to 1990. For 2017-2030 the estimates are calculated from the projection of renewable energy in the 2017 energy projection. The results are shown in the diagram below – both as annual effect (the light green curve) and annual effect from 1990 (the dark green curve). The results from the latter for 2020 and 2030 have also been reported in Table 3 of the CTF accompanying Denmark's BR3 (see Annex F).

Total effect of EE-PAMs

The total effects of EE-PAMs have been estimated using annual energy statistics back to 1990 and annual energy projections for 2017-2030. For the estimation it has been assumed that energy consumption will follow the economic growth minus 0.5 percentage point – where the latter is due to experience with the energy saving measures implemented with no incentives other than economic savings or other non-PAMs related incentives. The results are shown in the diagram below – both as annual effect if the energy mix would have stayed as it was in 1990 (the red curve) and annual effect with the actual or projected energy mix (the blue curve) – i.e. the CO_2 effect of EE-measures decreases when the energy consumption becomes less CO_2-intensive (tCO_2/PJ) due to the increase in RE. The results from the latter for 2020 and 2030 have also been reported in Table 3 of the CTF accompanying Denmark's BR3 (see Annex F).


RE- and EE-CO2-reduction effects 1990-2030
MtCO2 reduction
35
30
25
20
15
10
5
0
-5
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
RE effect on CO2 emission [MtCO2 reduction] (historically)
RE effect on CO2 emission [MtCO2 reduction] (projections)
RE effect on CO2 emission since 1990 [MtCO2 reduction] (historically)
RE effect on CO2 emission since 1990 [MtCO2 reduction] (projections)
EE effect on CO2 emission since 1990, without RE since 1990 [MtCO2 reduction] (historically)
EE effect on CO2 emission since 1990, without RE since 1990 [MtCO2 reduction] (projections)
EE effect on CO2 emission siden 1990, with RE since 1990 [MtCO2 reduction] (historically)
EE effect on CO2 emission since 1990, with RE since 1990 [MtCO2 reduction] (projections)

Annex C Results and supplementary information concerning greenhouse gas projections

This annex consists of the following three sub-annexes:

Annex C1: The results of Denmark's March 2017 'with measures' projection of greenhouse gas emissions 2016-2035.

Annex C2: A brief description of the work involved in preparing the energy projections.

Annex C3: A comparison of the latest reported greenhouse gas inventory with the "with measures" projections of Denmark's total greenhouse gas emissions included in Denmark's first to sixth national communication.

Annex C1 The results of Denmark's March 2017 'with measures' projection of greenhouse gas emissions 2016-2035

This annex contains the results of Denmark's March 2017 'with measures' projection of greenhouse gas emissions 2016-2035.

Note to Tables C1-1 to C1-8:

The tables show the historical and projected greenhouse gas emissions in ´000 tonnes CO_2 equivalents for total greenhouse gas emissions (GHGs), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) respectively.

As Denmark is able report historic inventories for emission of HFCs and PFCs separately, separate projections of future emissions of HFCs and PFCs have been elaborated (i.e. no inventory or projection as regards emissions of mixtures of HFCs and PFCs). Furthermore, with no historic emissions of NF_3, it is projected that Denmark's future emissions of NF_3 will also be zero.

The historical emission data 1990-2015 are from the May 2017 inventory (re-)submission.

The projected emission data 2016-2030 are from the March 2017 'with measures' energy and climate projection (without LULUCF) published by the Danish Energy Agency (DEA, March 2017, https://ens.dk/en/our-services/projections-and-models/danish-climate-and-energy-outlook) with the addition of estimates for 2031-2035, emissions from biological treatment of waste, minor additions in agricultural soils as well as LULUCF projections from the documentation report "Projection of greenhouse gases 2016-2035" published by Aarhus University, DCE – Danish Centre for Environment and Energy in November 2017 (Nielsen O.-K. et al., DCE, November 2017, Scientific Report No. 244, http://dce2.au.dk/pub/SR244.pdf). The changes are shown in the table below.

CH4 emissions in ktCO2eq.		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Change
3D	Agricultural soils	50	19	15	13	10	8	7	6	5	4	3	2	2	2	2	1	1	1	1	0	New knowledge taken into account
5B	Biological treatment of solid waste	207	244	262	280	293	304	315	326	328	329	331	332	334	335	336	338	339	341	342	343	New knowledge about leakages from biogas plants taken into account
Total change in total emissions		257	264	277	292	304	313	322	332	333	333	334	335	335	336	338	339	340	341	343	344	Total change

Another difference is that the effects of biocover estimated by the Danish Energy Agency in March 2017 (measure no. WA-9) and included in the DEA-report and in this report (NC7 as well as in BR3/CTF contained in Annex F), are not included in the DCE-report. The total difference from the DEA-report to the DCE-report is shown in the table below.

CH4 emissions in ktCO2eq.		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Difference
5A	Solid waste disposal	0	-75	-150	-225	-300	-285	-271	-257	-244	-232	-220	-209	-199	-189	-179	-170	-162	-154	-146	-139	Biocover effect
Total difference from DEA-report to DCE-report in total CH4 emissions and total GHG emissions		257	189	127	67	4	28	52	75	88	101	113	125	137	148	158	168	178	187	197	205	Total difference

Notes to Table C1-8:

* Corresponds to the IPCC category "Agriculture". Agriculture's energy consumption is included under "Energy (excluding Transport)".

** Projections of emissions and removals in the IPCC category LULUCF (land-use, land-use change and forestry) include all emissions by sources and removal by sinks in the category. However, under the Kyoto Protocol only emissions by sources and removal by sinks related to activities under Articles 3.3 and 3.4 of the Kyoto Protocol can be included in the accounting towards targets under the Kyoto Protocol as described in Chapter 5.

TABLE C1-1: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS GHGS

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

GHGs (greenhouse gases) emissions and projections (kt CO_2 equivalent)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)	GHGs (ktCO2eq)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	69139	77145	69912	65636	62661	54542	50380	47919	50751	45816	45129	44759	44684	48670	50881	49117
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	74042	81334	74120	70876	61864	55619	50524	52072	54192	49202	47899	47347	47127	50608	53004	50269
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**70356**	**78282**	**70786**	**66371**	**63217**	**54993**	**50801**	**48331**	**51175**	**46242**	**45547**	**45171**	**45090**	**49059**	**51269**	**49502**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	75259	82472	74994	71611	62420	56070	50945	52484	54616	49628	48317	47759	47534	50996	53392	50654
1. Total Energy, [including indirect CO_2]	**53619**	**61727**	**54414**	**51519**	**49667**	**41459**	**37155**	**34888**	**37641**	**32693**	**32069**	**31727**	**31747**	**35691**	**37836**	**36024**
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]	**53103**	**61028**	**53325**	**50643**	**49100**	**41067**	**36757**	**34497**	**37255**	**32325**	**31709**	**31372**	**31523**	**35353**	**37590**	**35784**
1. Energy industries, [including indirect CO_2]	**27468**	**33696**	**26921**	**23887**	**24636**	**19469**	**15909**	**13248**	**16337**	**11711**	**11296**	**11098**	**11355**	**15102**	**17418**	**15991**
a. Public electricity and heat production, [including indirect CO_2]	26007	31551	24439	21314	22216	17119	13613	10824	13944	9368	8986	8788	9485	12853	15151	13641
b. Petroleum refining	909	1390	1003	940	855	912	922	980	1009	1009	1009	1009	1009	1009	1009	1009
c. Manufacture of solid fuels and other energy industries	552	755	1479	1632	1565	1438	1373	1444	1385	1334	1302	1302	861	1241	1258	1341
2. Manufacturing industries and construction	**5460**	**5921**	**6019**	**5543**	**4422**	**3919**	**3956**	**3887**	**3624**	**3530**	**3478**	**3489**	**3511**	**3812**	**3980**	**4190**
3. Transport	**10734**	**12093**	**12285**	**13242**	**13125**	**11950**	**12130**	**12336**	**12332**	**12316**	**12341**	**12332**	**12325**	**12195**	**12029**	**11493**
a. Domestic aviation	251	246	194	177	179	145	139	130	133	134	136	138	138	140	141	141
b. Road transportation	9429	10751	11355	12345	12203	11150	11369	11579	11574	11582	11606	11597	11591	11505	11456	10922
c. Railways	300	306	230	234	245	250	255	251	249	224	223	222	220	173	58	58
d. Domestic navigation	754	790	506	486	499	404	368	377	376	376	376	376	376	376	374	372
e. Other transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Other sectors	**9270**	**8995**	**7899**	**7592**	**6708**	**5486**	**4529**	**4827**	**4737**	**4548**	**4374**	**4232**	**4112**	**4023**	**3943**	**3890**
a. Commercial/institutional	1499	1248	1021	1159	1064	933	1148	823	647	621	602	592	588	714	814	831
b. Residential	5155	5156	4191	3886	3553	2659	1620	2165	2244	2103	1961	1841	1732	1488	1253	1080
c. Agriculture/forestry/fishing	2616	2590	2687	2546	2091	1894	1761	1839	1845	1823	1810	1800	1792	1821	1876	1979
5. Other	**170**	**323**	**201**	**379**	**209**	**242**	**233**	**199**	**225**	**220**	**220**	**220**	**220**	**220**	**220**	**221**
B. Fugitive emissions from fuels	**516**	**699**	**1089**	**876**	**567**	**393**	**398**	**391**	**386**	**368**	**360**	**355**	**224**	**339**	**246**	**240**
1. Solid fuels	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2. Oil and natural gas and other emissions from energy production	**516**	**699**	**1089**	**876**	**567**	**393**	**398**	**391**	**386**	**368**	**360**	**355**	**224**	**339**	**246**	**240**
C. CO_2 Transport and storage	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Memo items (not included in national totals):																
International bunkers	**4784**	**6869**	**6400**	**4938**	**4513**	**4397**	**4973**	**4983**	**5127**	**5160**	**5193**	**5226**	**5231**	**5286**	**5302**	**5302**
Aviation	1748	1841	2336	2560	2425	2496	2708	2652	2796	2829	2861	2895	2899	2955	2971	2969
Navigation	3036	5027	4064	2378	2088	1901	2265	2331	2331	2331	2331	2331	2331	2331	2331	2333
Multilateral operations	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
CO_2 emissions from biomass	**4572**	**5639**	**6837**	**10642**	**14898**	**15006**	**14874**	**15691**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 captured	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2. Total industrial processes and product use	**2343**	**2878**	**3631**	**2789**	**2034**	**2132**	**2071**	**1992**	**1926**	**1877**	**1884**	**1921**	**1910**	**1844**	**1824**	**1857**
A. Mineral industry	1082	1418	1629	1563	804	996	1021	1052	1068	1084	1129	1178	1227	1398	1473	1519
B. Chemical industry	1003	870	966	1	1	1	1	2	1	1	1	1	1	1	1	1
C. Metal industry	60	73	61	16	0	0	0	0	0	0	0	0	0	0	0	0
D. Non-energy products from fuels and solvent use	165	185	190	215	203	192	185	173	187	187	187	187	187	187	187	187
E. Electronics industry	0	0	0	0	13	4	3	0	0	0	0	0	0	0	0	0
F. Product uses as substitutes for ODS	0	242	726	951	956	788	706	639	571	521	482	472	431	219	125	111
G. Other product manufacture and use	33	91	59	42	57	152	153	126	98	84	84	83	63	37	38	38
H. Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Total agriculture	**12631**	**12079**	**11228**	**10788**	**10326**	**10278**	**10400**	**10299**	**10463**	**10582**	**10578**	**10583**	**10572**	**10629**	**10702**	**10696**
A. Enteric fermentation	4039	3967	3631	3483	3631	3697	3711	3667	3707	3732	3746	3784	3814	3971	4153	4153
B. Manure management	2522	2796	3034	3165	2793	2608	2622	2586	2556	2518	2458	2413	2358	2246	2133	2131
C. Rice cultivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Agricultural soils	5448	4775	4290	3913	3743	3723	3822	3864	3993	4126	4168	4181	4196	4213	4219	4216
E. Prescribed burning of savannas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F. Field burning of agricultural residues	3	3	4	5	3	4	4	4	4	4	4	4	4	4	4	4
G. Liming	565	496	261	220	153	244	238	166	198	197	197	196	195	191	188	188
H. Urea application	15	15	2	0	1	1	1	1	1	1	1	1	1	1	1	1
I. Other carbon-containing fertilizers	38	26	5	2	3	2	2	10	4	4	4	4	4	4	4	4
J. Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Total LULUCF (land use, land-use change and forestry)	**4902**	**4190**	**4208**	**5240**	**-797**	**1077**	**144**	**4153**	**3441**	**3386**	**2771**	**2588**	**2444**	**1938**	**2123**	**1152**
A. Forest land	-553	-557	-580	536	-3768	-2424	-3970	229	-861	-283	-319	-337	-351	-972	-970	-2152
B. Cropland	4412	3912	3825	3540	2008	2270	3003	2601	2850	2245	1811	1648	1545	1661	1841	2053
C. Grassland	931	856	819	878	855	1170	1142	1363	1240	1202	1121	1114	1107	1101	1101	1101
D. Wetlands	102	75	76	117	91	53	61	55	224	226	151	152	153	155	158	164
E. Settlements	13	19	25	47	60	90	53	71	71	73	78	80	82	90	99	108
F. Other land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G. Harvested wood products	-2	-116	26	98	-72	-87	-146	-171	-83	-77	-70	-70	-93	-97	-107	-121
H. Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. Total waste	**1763**	**1598**	**1513**	**1276**	**1190**	**1123**	**1175**	**1153**	**1146**	**1090**	**1016**	**940**	**861**	**894**	**908**	**926**
A. Solid waste disposal	1536	1331	1073	909	772	702	691	655	630	533	437	338	241	218	205	196
B. Biological treatment of solid waste	50	78	254	177	234	235	289	301	323	364	385	407	425	478	502	526
C. Incineration and open burning of waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Wastewater treatment and discharge	157	167	166	169	163	168	170	172	172	172	172	173	174	177	180	182
E. Other	19	22	20	20	20	18	24	24	21	21	21	21	21	21	21	21
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Annual change in total long-term C storage	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Annual change in total long-term C storage in HWP waste	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

TABLE C1-2: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS CO_2

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

CO_2 emissions and projections (kt CO_2)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)	CO_2 (kt)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	53591	61615	54296	51522	49170	41632	37449	35147	37882	32998	32446	32173	32279	36370	38617	36891
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	58447	65751	58442	56691	48295	42622	37506	39205	41232	36291	35124	34667	34627	38210	40641	37943
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**54808**	**62752**	**55170**	**52257**	**49727**	**42083**	**37871**	**35559**	**38306**	**33424**	**32864**	**32585**	**32686**	**36758**	**39005**	**37276**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	59664	66888	59316	57426	48851	43073	37928	39618	41656	36717	35542	35079	35033	38599	41029	38329
1. Total Energy, [including indirect CO_2]	**52894**	**60554**	**53023**	**50222**	**48545**	**40633**	**36402**	**34134**	**36828**	**31931**	**31326**	**31000**	**31052**	**34957**	**37132**	**35358**
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]	**52553**	**60100**	**52300**	**49674**	**48192**	**40389**	**36151**	**33887**	**36578**	**31695**	**31093**	**30763**	**30905**	**34750**	**36993**	**35216**
1. Energy industries, [including indirect CO_2]	**27367**	**33298**	**26440**	**23470**	**24249**	**19232**	**15722**	**13080**	**16072**	**11486**	**11081**	**10885**	**11129**	**14884**	**17196**	**15785**
a. Public electricity and heat production, [including indirect CO_2]	25914	31164	23979	20912	21839	16892	13436	10667	13688	9153	8779	8584	9266	12644	14938	13445
b. Petroleum refining	908	1387	1000	938	854	911	920	978	1007	1007	1007	1007	1007	1007	1007	1007
c. Manufacture of solid fuels and other energy industries	545	746	1461	1619	1556	1429	1365	1436	1377	1327	1294	1294	856	1233	1251	1333
2. Manufacturing industries and construction	**5394**	**5839**	**5922**	**5458**	**4350**	**3866**	**3902**	**3830**	**3585**	**3490**	**3438**	**3449**	**3470**	**3768**	**3934**	**4142**
3. Transport	**10576**	**11918**	**12124**	**13102**	**12992**	**11813**	**11989**	**12192**	**12187**	**12170**	**12193**	**12184**	**12176**	**12042**	**11873**	**11339**
a. Domestic aviation	248	243	192	174	176	143	136	128	131	132	134	135	135	138	139	139
b. Road transportation	9283	10589	11203	12214	12080	11022	11236	11442	11437	11443	11466	11456	11449	11359	11306	10774
c. Railways	297	303	228	232	242	248	252	248	247	222	221	220	218	172	57	57
d. Domestic navigation	748	783	502	482	495	401	365	374	373	373	373	373	373	373	371	369
e. Other transportation																
4. Other sectors	**9049**	**8728**	**7617**	**7271**	**6394**	**5239**	**4309**	**4588**	**4513**	**4330**	**4163**	**4027**	**3912**	**3839**	**3772**	**3732**
a. Commercial/institutional	1488	1222	990	1125	1036	912	1128	803	635	610	591	581	577	701	801	818
b. Residential	5004	4983	4029	3681	3328	2484	1470	1995	2077	1942	1806	1691	1586	1361	1141	984
c. Agriculture/forestry/fishing	2557	2522	2598	2465	2030	1842	1711	1789	1800	1779	1766	1756	1749	1776	1830	1930
5. Other	**167**	**318**	**197**	**374**	**206**	**239**	**230**	**197**	**222**	**218**	**218**	**218**	**218**	**218**	**218**	**218**
B. Fugitive emissions from fuels	**341**	**453**	**723**	**548**	**353**	**244**	**250**	**247**	**249**	**236**	**233**	**237**	**147**	**207**	**140**	**142**
1. Solid fuels																
2. Oil and natural gas and other emissions from energy production	**341**	**453**	**723**	**548**	**353**	**244**	**250**	**247**	**249**	**236**	**233**	**237**	**147**	**207**	**140**	**142**
C. CO_2 Transport and storage																
Memo items (not included in national totals):																
International bunkers	**4743**	**6810**	**6344**	**4893**	**4472**	**4356**	**4927**	**4938**	**5080**	**5113**	**5145**	**5178**	**5182**	**5237**	**5252**	**5251**
Aviation	1731	1823	2312	2534	2401	2471	2681	2626	2768	2800	2833	2866	2870	2924	2940	2937
Navigation	3012	4987	4032	2359	2071	1886	2247	2312	2312	2312	2312	2312	2312	2312	2312	2314
Multilateral operations	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 emissions from biomass	**4572**	**5639**	**6837**	**10642**	**14898**	**15006**	**14874**	**15691**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 captured	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
2. Total industrial processes and product use	**1278**	**1642**	**1860**	**1795**	**1008**	**1188**	**1207**	**1226**	**1257**	**1272**	**1318**	**1366**	**1416**	**1587**	**1661**	**1707**
A. Mineral industry	1082	1418	1629	1563	804	996	1021	1052	1068	1084	1129	1178	1227	1398	1473	1519
B. Chemical industry	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1
C. Metal industry	30	39	41	16	0	0	0	0	0	0	0	0	0	0	0	0
D. Non-energy products from fuels and solvent use	165	184	189	214	202	191	184	172	187	187	187	187	187	187	187	187
E. Electronics industry																
F. Product uses as substitutes for ODS																
G. Other product manufacture and use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H. Other																
3. Total agriculture	**619**	**537**	**268**	**222**	**156**	**246**	**240**	**177**	**203**	**202**	**201**	**201**	**200**	**196**	**193**	**193**
A. Enteric fermentation																
B. Manure management																
C. Rice cultivation																
D. Agricultural soils																
E. Prescribed burning of savannas																
F. Field burning of agricultural residues																
G. Liming	565	496	261	220	153	244	238	166	198	197	197	196	195	191	188	188
H. Urea application	15	15	2	0	1	1	1	1	1	1	1	1	1	1	1	1
I. Other carbon-containing fertilizers	38	26	5	2	3	2	2	10	4	4	4	4	4	4	4	4
J. Other																
4. Total LULUCF (land use, land-use change and forestry)	**4856**	**4136**	**4146**	**5169**	**-876**	**989**	**57**	**4059**	**3350**	**3293**	**2678**	**2494**	**2348**	**1840**	**2024**	**1052**
A. Forest land	-585	-594	-605	512	-3791	-2476	-4023	176	-914	-336	-373	-390	-404	-1026	-1025	-2207
B. Cropland	4412	3912	3825	3540	2008	2270	3003	2597	2845	2240	1806	1643	1540	1656	1836	2048
C. Grassland	918	844	807	867	845	1158	1129	1350	1227	1189	1109	1102	1096	1089	1089	1089
D. Wetlands	101	71	69	108	78	39	47	41	208	209	133	133	133	135	138	144
E. Settlements	13	18	24	45	56	86	48	67	66	68	73	75	76	84	92	100
F. Other land																
G. Harvested wood products	-2	-116	26	98	-72	-87	-146	-171	-83	-77	-70	-70	-93	-97	-107	-121
H. Other																
Total waste	**18**	**20**	**18**	**18**	**18**	**16**	**21**	**21**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**
A. Solid waste disposal																
B. Biological treatment of solid waste																
C. Incineration and open burning of waste																
D. Wastewater treatment and discharge																
E. Other	18	20	18	18	18	16	21	21	19	19	19	19	19	19	19	19
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Annual change in total long-term C storage	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Annual change in total long-term C storage in HWP waste	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

TABLE C1-3: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS CH_4

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

CH_4 (methane) emissions and projections (kt CO_2 equivalent)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)	CH_4 (ktCO2eq)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	7624	8051	7907	7671	7347	6951	6947	6849	6933	6833	6712	6623	6518	6606	6651	6617
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	7643	8078	7943	7715	7399	7010	7004	6909	6994	6896	6776	6687	6583	6672	6717	6684
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**7624**	**8051**	**7907**	**7671**	**7347**	**6951**	**6947**	**6849**	**6933**	**6833**	**6712**	**6623**	**6518**	**6606**	**6651**	**6617**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	7643	8078	7943	7715	7399	7010	7004	6909	6994	6896	6776	6687	6583	6672	6717	6684
1. Total Energy, [including indirect CO_2]	**364**	**730**	**907**	**851**	**692**	**436**	**375**	**365**	**418**	**377**	**360**	**342**	**327**	**344**	**315**	**281**
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]	**242**	**557**	**660**	**611**	**534**	**328**	**267**	**264**	**323**	**284**	**271**	**264**	**274**	**246**	**230**	**205**
1. Energy industries, [including indirect CO_2]	**16**	**285**	**367**	**311**	**275**	**141**	**101**	**85**	**169**	**136**	**129**	**127**	**140**	**126**	**123**	**110**
a. Public electricity and heat production, [including indirect CO_2]	15	284	366	309	274	139	99	84	167	135	128	125	139	125	121	109
b. Petroleum refining	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
c. Manufacture of solid fuels and other energy industries	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Manufacturing industries and construction	**8**	**10**	**27**	**22**	**15**	**9**	**10**	**13**	**7**	**7**	**7**	**8**	**8**	**9**	**9**	**10**
3. Transport	**57**	**57**	**46**	**33**	**18**	**13**	**12**	**11**	**10**	**9**	**8**	**8**	**7**	**7**	**7**	**6**
a. Domestic aviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b. Road transportation	56	56	45	33	18	12	11	10	9	9	8	7	7	6	6	6
c. Railways	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d. Domestic navigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
e. Other transportation																
4. Other sectors	**159**	**202**	**218**	**243**	**225**	**166**	**145**	**154**	**137**	**132**	**126**	**121**	**118**	**104**	**91**	**79**
a. Commercial/institutional	6	20	26	28	23	15	15	14	7	7	7	7	7	7	7	7
b. Residential	119	138	126	157	164	121	101	112	108	103	98	93	90	74	60	47
c. Agriculture/forestry/fishing	34	44	65	58	38	30	29	27	22	22	21	21	21	22	23	25
5. Other	**2**	**3**	**2**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
B. Fugitive emissions from fuels	**123**	**173**	**247**	**240**	**158**	**108**	**107**	**101**	**95**	**92**	**88**	**78**	**54**	**98**	**85**	**75**
1. Solid fuels																
2. Oil and natural gas and other emissions from energy production	**123**	**173**	**247**	**240**	**158**	**108**	**107**	**101**	**95**	**92**	**88**	**78**	**54**	**98**	**85**	**75**
C. CO_2 Transport and storage																
Memo items (not included in national totals):																
International bunkers	**2**	**3**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Aviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navigation	2	3	2	1	1	1	1	1	1	1	1	1	1	2	2	2
Multilateral operations	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 emissions from biomass																
CO_2 captured																
2. Total industrial processes and product use	**2**	**3**	**3**	**4**	**2**	**3**	**3**	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
A. Mineral industry																
B. Chemical industry																
C. Metal industry																
D. Non-energy products from fuels and solvent use	0	0	0	1	0	0	1	0	1	1	1	1	1	1	1	1
E. Electronics industry																
F. Product uses as substitutes for ODS																
G. Other product manufacture and use	2	2	3	3	2	3	2	3	3	3	3	3	3	3	3	3
H. Other																
3. Total agriculture	**5585**	**5831**	**5719**	**5682**	**5633**	**5556**	**5590**	**5524**	**5560**	**5560**	**5534**	**5542**	**5534**	**5590**	**5669**	**5669**
A. Enteric fermentation	4039	3967	3631	3483	3631	3697	3711	3667	3707	3732	3746	3784	3814	3971	4153	4153
B. Manure management	1544	1861	2085	2195	1999	1856	1877	1854	1850	1826	1785	1755	1717	1617	1513	1513
C. Rice cultivation																
D. Agricultural soils																
E. Prescribed burning of savannas																
F. Field burning of agricultural residues	2	3	3	4	2	3	3	3	3	3	3	3	3	3	3	3
G. Liming																
H. Urea application																
I. Other carbon-containing fertilizers																
J. Other																
4. Total LULUCF (land use, land-use change and forestry)	**19**	**27**	**35**	**44**	**51**	**59**	**58**	**60**	**61**	**62**	**64**	**65**	**66**	**66**	**66**	**66**
A. Forest land	5	11				29	29	29	29	29	29	29	29	30	30	30
B. Cropland									5	5	5	5	5	5	5	5
C. Grassland	13	13	12	11	10	12	12	12	12	12	12	12	12	12	12	12
D. Wetlands	1	4	6	9	12	14	14	14	16	17	18	19	20	20	20	20
E. Settlements									0	0	0	0	0	0	0	0
F. Other land																
G. Harvested wood products																
H. Other																
Total waste	**1672**	**1489**	**1278**	**1134**	**1021**	**955**	**979**	**955**	**952**	**893**	**815**	**736**	**653**	**669**	**664**	**664**
A. Solid waste disposal	1536	1331	1073	909	772	702	691	655	630	533	437	338	241	218	205	196
B. Biological treatment of solid waste	38	57	101	118	140	143	176	188	210	248	265	284	298	335	342	349
C. Incineration and open burning of waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Wastewater treatment and discharge	96	99	103	105	106	108	109	109	111	110	111	111	112	114	116	117
E. Other	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites																
Annual change in total long-term C storage																
Annual change in total long-term C storage in HWP waste																

TABLE C1-4: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS N_2O

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

N_2O (nitrous oxide) emissions and projections (kt CO_2 equivalent)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O	N_2O
	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	7882	7134	6926	5472	5139	5036	5141	5182	5289	5402	5426	5430	5415	5460	5473	5481
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	7909	7161	6953	5499	5166	5065	5170	5216	5319	5432	5456	5460	5445	5491	5505	5515
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**7882**	**7134**	**6926**	**5472**	**5139**	**5036**	**5141**	**5182**	**5289**	**5402**	**5426**	**5430**	**5415**	**5460**	**5473**	**5481**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	7909	7161	6953	5499	5166	5065	5170	5216	5319	5432	5456	5460	5445	5491	5505	5515
1. Total Energy, [including indirect CO_2]	**361**	**443**	**484**	**445**	**431**	**390**	**379**	**389**	**395**	**385**	**383**	**385**	**368**	**391**	**389**	**385**
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]	**308**	**371**	**365**	**357**	**374**	**349**	**339**	**346**	**354**	**346**	**345**	**345**	**345**	**357**	**367**	**363**
1. Energy industries, [including indirect CO_2]	**86**	**113**	**113**	**106**	**112**	**97**	**87**	**82**	**97**	**89**	**86**	**86**	**85**	**92**	**99**	**96**
a. Public electricity and heat production, [including indirect CO_2]	79	102	94	93	103	88	78	74	88	81	78	78	79	84	91	87
b. Petroleum refining	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
c. Manufacture of solid fuels and other energy industries	6	9	17	12	8	7	7	7	7	7	7	7	4	6	6	7
2. Manufacturing industries and construction	**57**	**72**	**71**	**63**	**57**	**45**	**44**	**43**	**32**	**32**	**32**	**32**	**33**	**35**	**37**	**38**
3. Transport	**101**	**118**	**115**	**107**	**114**	**123**	**129**	**134**	**135**	**137**	**139**	**141**	**142**	**146**	**149**	**148**
a. Domestic aviation	3	3	2	3	3	2	2	2	2	2	2	2	2	2	2	2
b. Road transportation	89	106	107	99	105	116	122	127	128	130	132	134	135	140	143	142
c. Railways	3	3	2	2	2	2	2	2	2	2	2	2	2	1	0	0
d. Domestic navigation	6	6	4	4	4	3	3	3	3	3	3	3	3	3	3	3
e. Other transportation																
4. Other sectors	**63**	**65**	**63**	**78**	**89**	**81**	**76**	**85**	**87**	**86**	**85**	**84**	**83**	**81**	**80**	**79**
a. Commercial/institutional	5	6	5	6	6	5	6	5	5	5	5	5	5	5	6	6
b. Residential	32	35	35	49	61	54	49	57	59	58	57	57	56	53	51	49
c. Agriculture/forestry/fishing	26	24	23	24	23	22	22	23	23	23	22	22	22	23	23	24
5. Other	**1**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**
B. Fugitive emissions from fuels	**53**	**72**	**119**	**88**	**57**	**41**	**40**	**43**	**41**	**39**	**39**	**39**	**23**	**34**	**22**	**23**
1. Solid fuels																
2. Oil and natural gas and other emissions from energy production	**53**	**72**	**119**	**88**	**57**	**41**	**40**	**43**	**41**	**39**	**39**	**39**	**23**	**34**	**22**	**23**
C. CO_2 Transport and storage																
Memo items (not included in national totals):																
International bunkers	**40**	**56**	**54**	**43**	**40**	**39**	**44**	**44**	**45**	**46**	**46**	**46**	**47**	**48**	**48**	**49**
Aviation	17	18	23	25	24	25	27	26	28	28	28	29	29	30	31	32
Navigation	23	37	30	18	15	14	17	17	17	17	17	17	17	17	17	17
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO_2 emissions from biomass																
CO_2 captured																
2. Total industrial processes and product use	**1021**	**889**	**985**	**19**	**19**	**18**	**18**	**20**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**
A. Mineral industry																
B. Chemical industry	1003	869	965	0	0	0	0	0	0	0	0	0	0	0	0	0
C. Metal industry																
D. Non-energy products from fuels and solvent use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. Electronics industry																
F. Product uses as substitutes for ODS																
G. Other product manufacture and use	18	20	20	19	19	18	18	20	19	19	19	19	19	19	19	19
H. Other																
3. Total agriculture	**6427**	**5712**	**5241**	**4884**	**4537**	**4475**	**4569**	**4597**	**4700**	**4819**	**4842**	**4841**	**4838**	**4843**	**4840**	**4834**
A. Enteric fermentation																
B. Manure management	978	936	950	970	793	751	746	732	706	692	673	658	641	630	620	618
C. Rice cultivation																
D. Agricultural soils	5448	4775	4290	3913	3743	3723	3822	3864	3993	4126	4168	4181	4196	4213	4219	4216
E. Prescribed burning of savannas																
F. Field burning of agricultural residues	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
G. Liming																
H. Urea application																
I. Other carbon-containing fertilizers																
J. Other																
4. Total LULUCF (land use, land-use change and forestry)	**27**	**27**	**27**	**27**	**27**	**28**	**29**	**34**	**30**	**30**	**30**	**30**	**30**	**31**	**32**	**34**
A. Forest land	27	26	25	24	23	24	24	24	24	24	24	24	24	25	25	25
B. Cropland	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0
C. Grassland	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0
D. Wetlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. Settlements	0	1	1	2	3	4	4	5	5	5	5	5	5	6	7	8
F. Other land																
G. Harvested wood products																
H. Other																
Total waste	**74**	**90**	**217**	**124**	**151**	**152**	**175**	**176**	**175**	**178**	**182**	**185**	**189**	**207**	**225**	**243**
A. Solid waste disposal																
B. Biological treatment of solid waste	12	21	153	59	94	93	113	113	113	117	120	123	127	144	160	177
C. Incineration and open burning of waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Wastewater treatment and discharge	61	69	63	64	57	59	61	63	61	61	62	62	62	63	64	65
E. Other																
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites																
Annual change in total long-term C storage																
Annual change in total long-term C storage in HWP waste																

TABLE C1-5: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS HFCS

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

HFCs (hydrofluorocarbons) emissions and projections (kt CO_2 equivalent)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs	HFCs
	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	0	241	704	933	950	781	702	634	567	517	479	469	428	217	123	111
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	0	241	704	933	950	781	702	634	567	517	479	469	428	217	123	111
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**0**	**241**	**704**	**933**	**950**	**781**	**702**	**634**	**567**	**517**	**479**	**469**	**428**	**217**	**123**	**111**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	0	241	704	933	950	781	702	634	567	517	479	469	428	217	123	111
1. Total Energy, [including indirect CO_2]																
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]																
1. Energy industries, [including indirect CO_2]																
a. Public electricity and heat production, [including indirect CO_2]																
b. Petroleum refining																
c. Manufacture of solid fuels and other energy industries																
2. Manufacturing industries and construction																
3. Transport																
a. Domestic aviation																
b. Road transportation																
c. Railways																
d. Domestic navigation																
e. Other transportation																
4. Other sectors																
a. Commercial/institutional																
b. Residential																
c. Agriculture/forestry/fishing																
5. Other																
B. Fugitive emissions from fuels																
1. Solid fuels																
2. Oil and natural gas and other emissions from energy production																
C. CO_2 Transport and storage																
Memo items (not included in national totals):																
International bunkers																
Aviation																
Navigation																
Multilateral operations																
CO_2 emissions from biomass																
CO_2 captured																
2. Total industrial processes and product use		**241**	**704**	**933**	**950**	**781**	**702**	**634**	**567**	**517**	**479**	**469**	**428**	**217**	**123**	**111**
A. Mineral industry																
B. Chemical industry																
C. Metal industry																
D. Non-energy products from fuels and solvent use																
E. Electronics industry					5											
F. Product uses as substitutes for ODS		241	704	933	945	781	700	634	567	517	479	469	428	217	123	111
G. Other product manufacture and use																
H. Other																
3. Total agriculture																
A. Enteric fermentation																
B. Manure management																
C. Rice cultivation																
D. Agricultural soils																
E. Prescribed burning of savannas																
F. Field burning of agricultural residues																
G. Liming																
H. Urea application																
I. Other carbon-containing fertilizers																
J. Other																
4. Total LULUCF (land use, land-use change and forestry)																
A. Forest land																
B. Cropland																
C. Grassland																
D. Wetlands																
E. Settlements																
F. Other land																
G. Harvested wood products																
H. Other																
Total waste																
A. Solid waste disposal																
B. Biological treatment of solid waste																
C. Incineration and open burning of waste																
D. Wastewater treatment and discharge																
E. Other																
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites																
Annual change in total long-term C storage																
Annual change in total long-term C storage in HWP waste																

TABLE C1-6: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS PFCS

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

PFCs (perfluorocarbons) emissions and projections (kt CO_2 equivalent)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs	PFCs
	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	0	1	23	19	19	11	9	5	4	4	3	3	3	2	1	1
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	0	1	23	19	19	11	9	5	4	4	3	3	3	2	1	1
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**0**	**1**	**23**	**19**	**19**	**11**	**9**	**5**	**4**	**4**	**3**	**3**	**3**	**2**	**1**	**1**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	0	1	23	19	19	11	9	5	4	4	3	3	3	2	1	1
1. Total Energy, [including indirect CO_2]																
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]																
1. Energy industries, [including indirect CO_2]																
a. Public electricity and heat production, [including indirect CO_2]																
b. Petroleum refining																
c. Manufacture of solid fuels and other energy industries																
2. Manufacturing industries and construction																
3. Transport																
a. Domestic aviation																
b. Road transportation																
c. Railways																
d. Domestic navigation																
e. Other transportation																
4. Other sectors																
a. Commercial/institutional																
b. Residential																
c. Agriculture/forestry/fishing																
5. Other																
B. Fugitive emissions from fuels																
1. Solid fuels																
2. Oil and natural gas and other emissions from energy production																
C. CO_2 Transport and storage																
Memo items (not included in national totals):																
International bunkers																
Aviation																
Navigation																
Multilateral operations																
CO_2 emissions from biomass																
CO_2 captured																
2. Total industrial processes and product use		**1**	**23**	**19**	**19**	**11**	**9**	**5**	**4**	**4**	**3**	**3**	**3**	**2**	**1**	**1**
A. Mineral industry																
B. Chemical industry																
C. Metal industry																
D. Non-energy products from fuels and solvent use																
E. Electronics industry					7	4	3	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as substitutes for ODS		1	23	19	11	7	6	5	4	4	3	3	3	2	1	1
G. Other product manufacture and use																
H. Other																
3. Total agriculture																
A. Enteric fermentation																
B. Manure management																
C. Rice cultivation																
D. Agricultural soils																
E. Prescribed burning of savannas																
F. Field burning of agricultural residues																
G. Liming																
H. Urea application																
I. Other carbon-containing fertilizers																
J. Other																
4. Total LULUCF (land use, land-use change and forestry)																
A. Forest land																
B. Cropland																
C. Grassland																
D. Wetlands																
E. Settlements																
F. Other land																
G. Harvested wood products																
H. Other																
Total waste																
A. Solid waste disposal																
B. Biological treatment of solid waste																
C. Incineration and open burning of waste																
D. Wastewater treatment and discharge																
E. Other																
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites																
Annual change in total long-term C storage																
Annual change in total long-term C storage in HWP waste																

TABLE C1-7: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE GAS PROJECTION 2016-2035 AS REGARDS SF_6

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

SF_6 (sulphur hexafluoride) emissions and projections (kt CO_2 equivalent)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6	SF_6
	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)	(ktCO2eq)
Total CO_2 equivalent emissions without LULUCF, without indirect CO_2	42	102	56	20	36	131	132	103	76	62	62	61	42	16	16	16
Total CO_2 equivalent emissions with LULUCF, without indirect CO_2	42	102	56	20	36	131	132	103	76	62	62	61	42	16	16	16
Total CO_2 equivalent emissions without LULUCF, with indirect CO_2	**42**	**102**	**56**	**20**	**36**	**131**	**132**	**103**	**76**	**62**	**62**	**61**	**42**	**16**	**16**	**16**
Total CO_2 equivalent emissions with LULUCF, with indirect CO_2	42	102	56	20	36	131	132	103	76	62	62	61	42	16	16	16
1. Total Energy, [including indirect CO_2]																
A. Fuel combustion activities (sectoral approach), [including indirect CO_2]																
1. Energy industries, [including indirect CO_2]																
a. Public electricity and heat production, [including indirect CO_2]																
b. Petroleum refining																
c. Manufacture of solid fuels and other energy industries																
2. Manufacturing industries and construction																
3. Transport																
a. Domestic aviation																
b. Road transportation																
c. Railways																
d. Domestic navigation																
e. Other transportation																
4. Other sectors																
a. Commercial/institutional																
b. Residential																
c. Agriculture/forestry/fishing																
5. Other																
B. Fugitive emissions from fuels																
1. Solid fuels																
2. Oil and natural gas and other emissions from energy production																
C. CO_2 Transport and storage																
Memo items (not included in national totals):																
International bunkers																
Aviation																
Navigation																
Multilateral operations																
CO_2 emissions from biomass																
CO_2 captured																
2. Total industrial processes and product use	**42**	**102**	**56**	**20**	**36**	**131**	**132**	**103**	**76**	**62**	**62**	**61**	**42**	**16**	**16**	**16**
A. Mineral industry																
B. Chemical industry																
C. Metal industry	30	34	20	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Non-energy products from fuels and solvent use																
E. Electronics industry																
F. Product uses as substitutes for ODS																
G. Other product manufacture and use	13	68	36	20	36	131	132	103	76	62	62	61	42	16	16	16
H. Other																
3. Total agriculture																
A. Enteric fermentation																
B. Manure management																
C. Rice cultivation																
D. Agricultural soils																
E. Prescribed burning of savannas																
F. Field burning of agricultural residues																
G. Liming																
H. Urea application																
I. Other carbon-containing fertilizers																
J. Other																
4. Total LULUCF (land use, land-use change and forestry)																
A. Forest land																
B. Cropland																
C. Grassland																
D. Wetlands																
E. Settlements																
F. Other land																
G. Harvested wood products																
H. Other																
Total waste																
A. Solid waste disposal																
B. Biological treatment of solid waste																
C. Incineration and open burning of waste																
D. Wastewater treatment and discharge																
E. Other																
Memo items (additional, not included in national totals):																
Long-term storage of C in waste disposal sites																
Annual change in total long-term C storage																
Annual change in total long-term C storage in HWP waste																

TABLE C1-8: THE RESULT OF DENMARK'S 'WITH MEASURES' GREENHOUSE PROJECTION 2016-2035 IN THE FORMAT RECOMMENDED UNDER THE UNFCCC

Source: *Denmark's Energy and Climate Outlook 2017* (Danish Energy Agency, March 2017) and *Nielsen O.-K. et al.* (DCE, November 2017).

Projections of Denmark's greenhouse gas emissions and removals								
Scenario:	The base scenario, which is a "with measures" projection, i.e. only includes the expected effects of implemented and adopted measures.							
Year:	2015 (from the 2017 inventory submission)							
Sector	Emissions and removals (in kt CO_2 equivalent)							
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3	Total
Indirect CO_2	*412*							*412*
Energy (excl. Transport), *with indirect CO_2*	21943	354	255					22552
Transport	12192	11	134					12336
Industrial processes and Product Use	1226	4	20	634	5	103	0	1992
Agriculture*	177	5524	4597					10299
LULUCF**	4059	60	34					4153
Waste	21	955	176					1153
Total (without LULUCF, without indirect CO_2)	35147	6849	5182	634	5	103	0	47919
Total (with LULUCF, without indirect CO_2)	39205	6909	5216	634	5	103	0	52072
Total (without LULUCF, *with indirect CO_2*)	**35559**	**6849**	**5182**	**634**	**5**	**103**	**0**	**48331**
Total (with LULUCF, *with indirect CO_2*)	39618	6909	5216	634	5	103	0	52484

Projections of Denmark's greenhouse gas emissions and removals								
Scenario:	The base scenario, which is a "with measures" projection, i.e. only includes the expected effects of implemented and adopted measures.							
Year:	2013-2020/8 (2013-2015 are from the 2017 inventory submission)							
Sector	Emissions and removals (in kt CO_2 equivalent)							
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3	Total
Indirect CO_2	*421*							*421*
Energy (excl. Transport), *with indirect CO_2*	20960	365	249					21575
Transport	12113	10	135					12258
Industrial processes and Product Use	1281	3	19	572	5	84	0	1964
Agriculture*	209	5550	4710					10469
LULUCF**	2408	62	30					2500
Waste	19	867	177					1063
Total (without LULUCF, without indirect CO_2)	34161	6796	5290	572	5	84	0	46907
Total (with LULUCF, without indirect CO_2)	36570	6857	5320	572	5	84	0	49408
Total (without LULUCF, *with indirect CO_2*)	**34582**	**6796**	**5290**	**572**	**5**	**84**	**0**	**47329**
Total (with LULUCF, *with indirect CO_2*)	36991	6857	5320	572	5	84	0	49829

Projections of Denmark's greenhouse gas emissions and removals								
Scenario:	The base scenario, which is a "with measures" projection, i.e. only includes the expected effects of implemented and adopted measures.							
Year:	2020							
Sector	Emissions and removals (in kt CO_2 equivalent)							
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3	Total
Indirect CO_2	*406*							*406*
Energy (excl. Transport), *with indirect CO_2*	18876	320	226					19422
Transport	12176	7	142					12325
Industrial processes and Product Use	1416	3	19	428	3	42	0	1910
Agriculture*	200	5534	4838					10572
LULUCF**	2348	66	30					2444
Waste	19	653	189					861
Total (without LULUCF, without indirect CO_2)	32279	6518	5415	428	3	42	0	44684
Total (with LULUCF, without indirect CO_2)	34627	6583	5445	428	3	42	0	47127
Total (without LULUCF, *with indirect CO_2*)	**32686**	**6518**	**5415**	**428**	**3**	**42**	**0**	**45090**
Total (with LULUCF, *with indirect CO_2*)	35033	6583	5445	428	3	42	0	47534

Projections of Denmark's greenhouse gas emissions and removals								
Scenario:	The base scenario, which is a "with measures" projection, i.e. only includes the expected effects of implemented and adopted measures.							
Year:	2025							
Sector	Emissions and removals (in kt CO_2 equivalent)							
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3	Total
Indirect CO_2	*388*							*388*
Energy (excl. Transport), *with indirect CO_2*	22915	337	244					23497
Transport	12042	7	146					12195
Industrial processes and Product Use	1587	3	19	217	2	16	0	1844
Agriculture*	196	5590	4843					10629
LULUCF**	1840	66	31					1938
Waste	19	669	207					894
Total (without LULUCF, without indirect CO_2)	36370	6606	5460	217	2	16	0	48670
Total (with LULUCF, without indirect CO_2)	38210	6672	5491	217	2	16	0	50608
Total (without LULUCF, *with indirect CO_2*)	**36758**	**6606**	**5460**	**217**	**2**	**16**	**0**	**49059**
Total (with LULUCF, *with indirect CO_2*)	38599	6672	5491	217	2	16	0	50996

Projections of Denmark's greenhouse gas emissions and removals								
Scenario:	The base scenario, which is a "with measures" projection, i.e. only includes the expected effects of implemented and adopted measures.							
Year:	2030							
Sector	Emissions and removals (in kt CO_2 equivalent)							
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3	Total
Indirect CO_2	*388*							*388*
Energy (excl. Transport), *with indirect CO_2*	25259	308	240					25807
Transport	11873	7	149					12029
Industrial processes and Product Use	1661	3	19	123	1	16	0	1824
Agriculture*	193	5669	4840					10702
LULUCF**	2024	66	32					2123
Waste	19	664	225					908
Total (without LULUCF, without indirect CO_2)	38617	6651	5473	123	1	16	0	50881
Total (with LULUCF, without indirect CO_2)	40641	6717	5505	123	1	16	0	53004
Total (without LULUCF, *with indirect CO_2*)	**39005**	**6651**	**5473**	**123**	**1**	**16**	**0**	**51269**
Total (with LULUCF, *with indirect CO_2*)	41029	6717	5505	123	1	16	0	53392

Projections of Denmark's greenhouse gas emissions and removals								
Scenario:	The base scenario, which is a "with measures" projection, i.e. only includes the expected effects of implemented and adopted measures.							
Year:	2035							
Sector	Emissions and removals (in kt CO_2 equivalent)							
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3	Total
Indirect CO_2	*385*							*385*
Energy (excl. Transport), *with indirect CO_2*	24019	274	238					24531
Transport	11339	6	148					11493
Industrial processes and Product Use	1707	3	19	111	1	16	0	1857
Agriculture*	193	5669	4834					10696
LULUCF**	1052	66	34					1152
Waste	19	664	243					926
Total (without LULUCF, without indirect CO_2)	36891	6617	5481	111	1	16	0	49117
Total (with LULUCF, without indirect CO_2)	37943	6684	5515	111	1	16	0	50269
Total (without LULUCF, *with indirect CO_2*)	**37276**	**6617**	**5481**	**111**	**1**	**16**	**0**	**49502**
Total (with LULUCF, *with indirect CO_2*)	38329	6684	5515	111	1	16	0	50654

Annex C2 Further information on energy projections

Contents

C2.1 A BRIEF DESCRIPTION OF THE WORK INVOLVED IN PREPARING THE ENERGY PROJECTIONS IN DENMARK

The work involved in preparing the Danish energy projections goes through the following stages:

1. Final energy consumption of businesses and the domestic sector (except transport)
2. Energy consumption for production of electricity and district heating
3. Own consumption by refineries and gas works
4. Own consumption by the North Sea, including flaring
5. Industrial cogenerated heating and power, mini cogenerated heating and power, biogas etc.
6. Energy consumption by transport

C2.1.1 EMMA AND ADAM

C2.1.1.1 General

The economic macro model EMMA is calculated in item 1. Ramses, which is a technical/economic optimisation model, is used for calculations in item 2 based on input of the energy consumption from the housing models and EMMA. Item 3 is automatically projected based on the latest statistics. Item 4 is projected on the basis of the information from Mærsk and statements of the Danish oil and gas reserves. Item 5 is projected on the basis of current plans to expand – after which it remains unchanged. The Danish Road Directorate has provided the main part of the transport projection (item 6), however the Danish Energy Authority has prepared the very simple projections of international shipping, military transport and the size of cross-border trading. Moreover, the Danish Road Directorate's tender for electric trains is adjusted to the statistics. The different parts of the projection are collected in the Danish Energy Authority's collective model, which can be used to calculate gross energy consumption and energy-related CO_2 emissions. Extracts from this model are given to DCE (former NERI), and DCE has calculated emissions from the energy sector.

C2.1.1.2 Business and domestic sectors

As mentioned, projections of the final energy consumption in the business and domestic sectors are based on an ADAM/EMMA projection. EMMA is a macro model that describes the final energy consumption broken down into a number of sectors and seven types of energy. It is based on historical experience with the behaviour of businesses and households and is documented in *Environmental satellite models for ADAM*, NERI Technical Report no. 148, NERI 1995.

In EMMA, energy consumption is determined by three factors: production, energy prices/taxes and energy efficiencies/ trends. Increased economic activity will increase the demand for energy input, whereas increased energy prices and taxes will pull in the direction of a more limited demand for the fuels. Improved energy efficiency will mean that production can be maintained using less energy, and in EMMA this results in reduced energy consumption.

The EMMA system is structured based on the link between five energy-specific models developed at NERI and Risø National Laboratory. These models determine the use of seven types of energy (liquid fuels, solid fuels, gas, biofuels, transport energy, electricity and district heating) in the domestic and business sectors, conversion of fuels (solid fuels, liquid fuels, gas, biomass) by the supply sector to electricity and district heating, and it calculates the emissions this use of energy entails. EMMA is structured as a satellite model to ADAM, which is a widely used Danish macro-economic model that covers the entire economy.

The ADAM/EMMA system can calculate the effect of a number of initiatives. One of the most important aspects though, is that energy prices play an important role. The overall level for energy prices affects the total energy consumption, and the relationship between the prices of different types of energy affects the composition of energy consumption. Therefore the model can estimate the effect of CO_2 taxes, which in part raise all energy prices and in part change the relative energy prices, so that e.g. coal, which emits a lot of CO_2, is more expensive than natural gas that emits less CO_2.

The projection of production in the business sector and inflation is based on ADAM projections prepared by the Ministry of Finance.

C2.1.1.3 Transport

The projections of the use of energy by the transportation sector is based on projected road work from the Department of Transport taking into account economic projections from the Department of Finance. Assumptions are made with respect to the development in energy efficiency, share of biofuels as well as the penetration of electrical cars. Projected energy use by rail transport, domestic sea shipping and domestic aviation is based on the average energy used in the past three years. Energy use by foreign aviation is projected according to the growth rates from the latest EU primes baseline.

C2.1.1.4 Strengths and weaknesses

As mentioned, the foundation for the forecast on energy consumption is the economic projections from the Department of Finance. This is the official long term economic forecast from the Danish government. The economic forecast is based on detailed projections of structures within the economy linked with econometric analyses on time series spanning 50 years on the behavior of economic agents. The projections suffer from the standard range of weaknesses connected with econometric modeling as well as uncertainty with regards to projections of exogenous variables, such as international energy prices and international growth. The economic projections are linked to an econometric energy consumption model that is based on estimation of behavioral patterns in consumption of energy. The energy consumption modeling suffers from rigidity in technological change, and as such, is not well equipped to forecasts in the very long term.

The strength of the approach used for the transport projection is that it is simple and transparent. The weakness of the transport model is that it doesn't take energy prices into account and that it does not allow for modal shift in transport.

C2.1.2 RAMSES

C2.1.2.1 General

Projection of the production of electricity and district heating (item 2 above) has been calculated using the Danish Energy Authority's Ramses-model based on the demand for electricity and district heating as calculated in the projection of the consumer sectors. In the projection, the production of electricity and heating is broken down into existing and possibly new production facilities based on the facilities' technical specifications, price of fuel and CO_2 emissions trading prices. The model also determines electricity prices on the Nordic market and the scope of electricity exchange with the other Nordic countries and takes account of the limits to the trading capacity. The production of electricity has been liberalised throughout the Nordic countries and therefore there is no close link to Denmark's demand, rather, it is based on the characteristics of the individual facility and the market prices. Industrial and local mini combined heat and power production are not projected in the Ramses model, therefore a separate (bottom-up) projection of this production has been prepared.

A more detailed description of Ramses can be found in the following.

Ramses (version 6) is a technical-economic model that describes the production of electricity and district heating in a random number of electricity areas, at present in the Nordic countries. It is a partially linear optimisation model that can calculate the production and fuel consumption at a great number of installations on a hourly basis. As the model is mainly designed for analysing the effects in Denmark, at present the Danish installations are described in more detail than utilities in the other Nordic countries.

The model calculates the price of electricity that creates equilibrium on the market. As regards electricity, the Nordic countries are divided into five areas separated by transmission connections with a maximum transfer capacity. If the need for transmissions exceeds the capacity, the price of electricity differs in the areas. The five areas are Finland, Sweden, Norway, western Denmark and eastern Denmark. As regards district heating there are far more isolated areas that each have their own price.

In addition to information concerning the transmission connections and detailed information on the type, efficacy and size of installation, the following input are used in the model: fuel prices, CO_2 allowances prices, fuel taxes as well as the demand for electricity and district heating in the area. Output from the model includes production, fuel consumption and emissions from each installation, and the price of electricity in each area.

In the model, all installations in each area are sorted according to the short-term, marginal production costs for electricity. Production is set in motion at the utilities one after another – starting with the cheapest one, and this continues until the demand (including any need for exports or imports) in each operational hour is met. The marginal costs of the most expensive producing installations thus set the price of electricity in the area. The largest hydropower plants have been given special treatment because they can adjust the time of production for strategic reasons using the water reservoirs.

The decision concerning investments in new utilities is kept separate from the model. Investments are only made if model calculations show that the installation can recover the investment, assuming specific rates of subsidies for RE (particularly wind turbines) are given, and free CO_2 allowances for fossil-based installations, etc. Installations placed in an area where district heating is needed typically have a competitive advantage due to income from the sale of heat.

In addition to prices and amounts, the model can estimate the overall system's security of supply as regards electricity. This is done on the basis of stochastic input on the probability of damage to installations and transmission connections, time series for production from wind turbines and hydropower as well as the variation in consumption.

Ramses is used both for projection and analysis purposes. For example, it has been used to analyse the effect of new transmission connections, new wind turbine farms, changes in electricity consumption or changes in the prices of fuels and CO_2 allowances.

C2.1.2.2 Strengths and weaknesses

The model's strength is also its weakness, in the sense that the model is very detailed. The detailed model makes it possible to create simulations that are relatively close to reality/observations. However, the detailed model also requires maintenance of a lot of data for the model.

C2.2 FURTHER SPECIFIC ENERGY PROJECTION INFORMATION

C2.2.1 Production of electricity and district heating

C2.2.1.1 Main points

• The green transition of electricity and district heating production will continue up to 2020. Renewable energy is expected to cover about 72% of electricity consumption and 71% of district heating consumption in 2020, compared with about 56% and 51%, respectively, today.

• From 2020 to 2030 the share of renewable energy will fall to 62% for electricity and 67% for district heating. This is primarily due to rising electricity consumption coupled with the assumption of the discontinuation of the subsidy scheme for onshore wind, etc.

• The share of wind power in electricity consumption will increase from 42% in 2015 to 48% in 2020 and then drop to 39% in 2030. The fall in the share up to 2030 is due to the fact that many wind turbines that reach the end of their operational life will not be replaced by new ones. However, it is also due to increasing electricity consumption.

• Photovoltaic solar modules will cover up to 4% of electricity consumption in 2020 and up to 7% in 2030 compared with 2% today.

• There will be no significant increase in deployment of large electrically powered heat pumps.

• Consumption of solid biomass will increase from just less than 57 PJ in 2015 to 98 PJ in 2020. Consumption will fall to 89 PJ up to 2030. Consumption is sensitive to changes in the relationship between coal prices, CO2 prices, and the price of biomass.

• Consumption of coal will fall from 103 PJ in 2015 to 61 PJ in 2018, but will then increase dramatically to 127 PJ in 2030. The increased use of coal will be especially driven by a pronounced rise in electricity consumption combined with the assumption of low deployment of new wind power.

• In the alternative scenario, in which coal will be phased out from Ørsted's (former Dong Energy) plants in 2023, coal consumption will not increase to the same degree as in the basic scenario, while biomass consumption will increase more than in the basic scenario.

C2.2.1.2 Introduction

Energy consumption to produce electricity and district heating accounts for almost 41% of total Danish gross energy consumption, and therefore it is an important element in the overall green transition towards fossil-fuel independence and reducing emissions of greenhouse gases.

Electricity will increasingly be generated by wind power and biomass, instead of by coal and natural gas.

District heating production is also undergoing a transition, primarily from coal and natural gas to biomass. A fall in the share of district heating co-produced with electricity (Combined Heat & Power, CHP) has resulted in a development with heat production only, based on renewables such as biomass and solar heating, while production from large electricity-powered heat pumps has so far been absent from Denmark.

In 2015, 56% of electricity consumption and about 51% of district heating consumption was covered by renewable energy, compared to 16% and 19%, respectively, in 2000. The large expansion of wind power has meant that wind power has risen from covering 12% of electricity consumption in 2000 to 42% in 2015. Electricity production is increasingly taking place through interplay with countries neighbouring Denmark, because electricity is exchanged through interconnectors. If it is very windy in Denmark, it is possible to sell electricity abroad. On the other hand, if there has been a lot of rain, Norway will have a surplus of hydropower-based electricity which it can sell to Denmark. Exchange is important as overall it ensures efficient exploitation of electric power plants, high security of electricity supply and lower prices.

C2.2.1.3 Developments up to 2020 and 2030

Continued development of the sector has already been planned for the years up to 2020, and many power plants have decided to transition, or are already in process of transitioning, from coal or natural gas to biomass. At the same time, further deployment of wind power is expected to continue, among other things due to the offshore and nearshore wind turbine projects in the 2012 Energy Agreement. Less extensive deployment is expected after 2020 as Kriegers Flak is expected to be in full operation in 2021.

Renewable energy is expected to cover about 72% of electricity consumption and 71% of district heating consumption in 2020, compared with about 56% and 51%, respectively, today. Up to 2030, the shares of renewable energy in the basic scenario will fall to 62% for electricity and 67% for district heating. Note that there is great uncertainty attached to renewable energy shares, particularly in the long term. For example, the sensitivity calculations show that a combination of increased electricity consumption, lower wind deployment and the use of biomass can reduce renewable energy in electricity consumption to 55% in 2030, whereas the opposite could increase it to 71%.

TABLE C2.1: SHARE OF CONSUMPTION OF ELECTRICITY AND DISTRICT HEATING COVERED BY RENEWABLE ENERGY.

Share (%)	2000	2005	2010	2015	2020	2025	2030
Renewable energy in electricity consumption	16	27	35	56	72 (78)	68 (70)	62 (70)
- of this, wind power	12	18	22	42	48	49	39
- of this, other renewables	4	9	13	14	24 (30)	19 (21)	23 (31)
Renewable energy in district heating consumption	19	27	34	51	71	68 (75)	67 (74)

Note: Biodegradable waste is included in renewable energy. Numbers in brackets cover the alternative scenario with implementation of Ørsted's (former DONG Energy) announced phase-out of coal.

The share of electricity generated by wind power will rise in the short term, at the expense of decreased CHP production and in particular decreased separate electricity production (condensing power production) at large-scale power plants. After 2020, wind power generation will decrease because obsolete turbines will not be replaced by new turbines. In the basic scenario, power plants with separate electricity generation will take over some electricity production in order to meet the rising demand for electricity from a greater number of data centres, etc.

Photovoltaic solar modules covered about 2% of electricity consumption in 2015 and, according to this Outlook, will cover up to 4% in 2020 and up to 7% in 2030. The further deployment of solar photovoltaic installations will primarily take place in connection with buildings that can obtain a financial benefit by producing their own electricity which will not be subject to taxes. However, with the current framework, i.e. without subsidies, further deployment of commercial installations supplying all the electricity produced to the grid, is not likely.

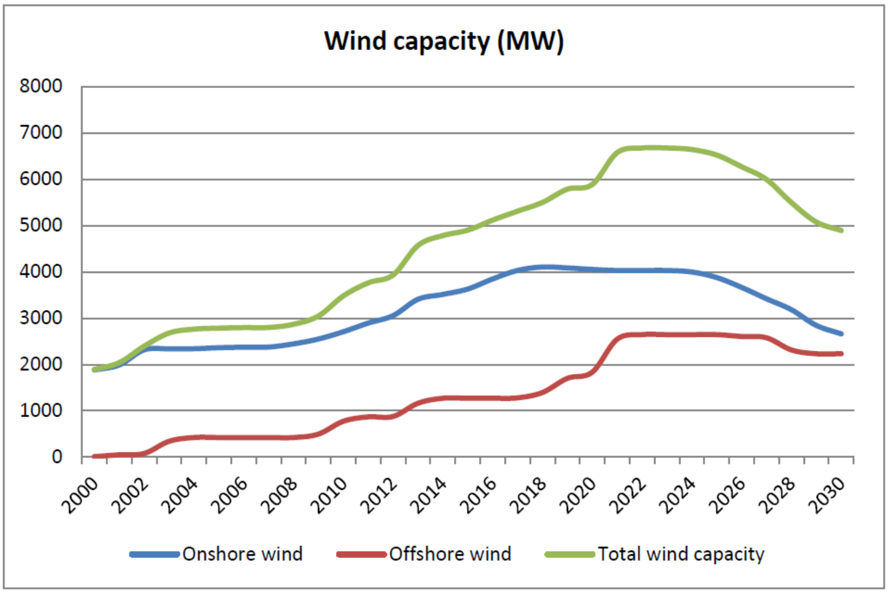
District heating from CHP plants will be about 71% in 2020 and 70% in 2030, compared with 62% today. A small part of district heating from boilers will be replaced by CHP, solar heating and electricity in the coming years.

C2.2.1.3.1 Electricity from wind power to reach 49% in 2025, but decrease in the long term

Electricity from wind power accounted for 42% of electricity consumption in 2015. In 2020, the share of wind power is expected to be 48%. This development will be due primarily to the commissioning of offshore wind farms (Horns Rev 3, Kriegers Flak) and nearshore wind turbines (Vesterhav Syd and Vesterhav Nord) as agreed in the 2012 Energy Agreement. This deployment is reasonably certain, albeit there may be delays in commissioning dates. The extent of the deployment of onshore and offshore wind power under the Open-Door scheme is less certain. This is primarily due to the expiry of the current scheme in 2018, and due to the frozen-policy approach applied in the projections, it is assumed that all new projects will subsequently depend solely on market terms. At the moment, low electricity prices on the spot market are causing some uncertainty about the future revenue base for investors. Likewise, planning aspects, such as municipal administration of the distance requirements and certain public concerns, contribute to the uncertainty regarding future deployment of onshore wind turbines.

According to this Outlook, new onshore wind capacity will not be installed to the same extent as is expected to be dismantled as turbines reach then end of their technical lifespan. The total capacity of onshore wind will therefore stagnate and fall up to 2030. It is estimated that some new capacity will be established at the end of the period; however, not enough to maintain the total capacity. The speed and timing of this decrease in capacity depends on the actual technical and economic lifespan of the turbines, which is uncertain.

FIGURE C2.1: ONSHORE AND OFFSHORE WIND CAPACITY WILL DECREASE UP TO 2030.



C2.2.1.3.2 Interconnectors play an important role

A large share of wind power increases the value of cooperation with Denmark's neighbouring countries in the form of strong interconnectors. This means that intermittent production from wind power can be sold cost-efficiently, while also minimising the need for national capacity reserves and maintaining a high security of electricity supply.

Denmark is already electrically connected to Norway, Sweden and Germany, although the capacity in the connection between Jutland and Germany cannot be fully exploited due to internal bottlenecks in Germany. The connection to Norway has recently been improved with the establishment of Skagerrak 4, and up to 2020, part of Denmark will be electrically connected to the Netherlands. Similarly, a new connection to Germany will be constructed from the future offshore wind farm at Kriegers Flak. The Viking Link connection from Denmark to the United Kingdom, as proposed by Energinet.dk and which is being considered by the government, has not been factored in.

The connection between Jutland and Germany is expected to provide higher capacity up to 2020, and an additional upgrade after 2020 is also expected. This could be significant for the economic aspects of incorporating increasing amounts electricity from wind power in the short term. Furthermore, improved interconnectors will help increase the operational hours for large-scale power plants in the period after 2020.

BOX C2.1: CROSS-BORDER ELECTRICITY IN DENMARK'S ENERGY AND CLIMATE OUTLOOK 2017

Denmark's cross-border electricity exchange with neighbouring countries is considerable. It varies depending on fluctuations in weather (e.g. precipitation and wind) but other factors are also very important, such as the power plants and interconnectors available in Denmark and abroad.

In this Outlook, cross-border electricity exchange is modelled as part of the operation of the Danish electricity system in the so-called RAMSES model. The critical factor is the state of competition between Danish and foreign electricity production. A normal year is used in the calculations, which is why fluctuations in climate are not significant. Calculations on cross-border electricity for a single year are very uncertain, in part because calculations for neighbouring countries are carried out on an aggregate level. Due to this uncertainty and because historical electricity production is closely connected to consumption, the basic scenario assumes that cross-border electricity exchange is on average zero, meaning that electricity production corresponds to electricity consumption. A production of electricity that corresponds to electricity consumption is the best estimate of Danish fuel consumption in connection with electricity production.

This means, that in terms of calculation methodology, the modelled fuel consumption for electricity production is adjusted according to calculated cross-border electricity exchanges (see the background report for further information). This adjustment is made using the average thermal variable electricity production for the year in question (the average electricity production from coal, natural gas, oil, wood pellets and wood chips). The Danish Energy Agency uses the same approach for calculating energy statistics.

The above does not apply to the alternative scenario, however. In the context of this Outlook, the implementation of Ørsted's (former DONG Energy) announced phase-out of coal would mean significantly higher electricity imports, and this is an important point in itself. Due to this, and in order to be able to compare directly with the basic scenario, the alternative scenario includes cross-border electricity calculated using RAMSES; however, adjusted using the same figures as are used to adjust electricity generation in the basic scenario. This also applies to the sensitivity calculations.

In the future, the Danish Energy Agency will continue to work on improving the basis for calculation to assess cross-border electricity exchange in the projections. This includes improving data, methodology and the interpretation of the model results themselves, particularly with regard to this element in the work.

BOX C2.2: IMPLEMENTATION OF ØRSTED'S /DONG ENERGY'S ANNOUNCEMENT IN THE ALTERNATIVE SCENARIO

On 2 February 2017, DONG Energy (the name of the energy company was changed to "Ørsted" as of 6 November 2017) announced that they will stop using coal from 2023. This announcement is not included in the basic scenario, see section 1.6. However, because implementation of Ørsted's announcement will have serious consequences for development, it is included in the alternative scenario in this Outlook. The outlined scenario is merely one among several possible scenarios, as there are currently no specific applications that would enable inclusion of the objective to phase out coal.

Implementation of Ørsted's intention has two overall consequences for their power plants:

1. CPH plants which have been retrofitted from coal to biomass will continue operating solely on biomass.

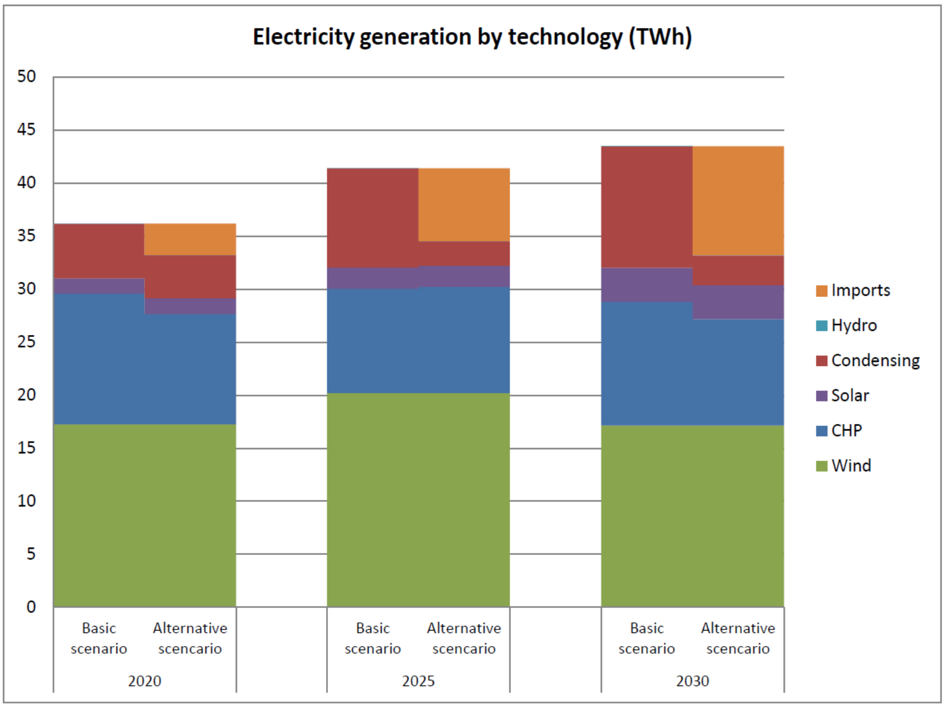
2. Older coal-fired power plants will remain out of operation and can therefore not be used as extra capacity for the production of electricity to meet the expected rise in Danish electricity consumption.

The first point will lead to a phase-out of coal in the larger cities (Copenhagen, Aarhus). Furthermore, it will lead to slightly lower electricity production from the retrofitted plants than would otherwise be the case.

The second point will have significant consequences for electricity production and electricity imports. The older Danish power plant units are expected to be competitive with foreign plants. If they are not put into service, the cheapest alternative will be increased imports of electricity.

However, this development is uncertain and it depends on trends in fuel prices and the production mix in neighbouring countries.

FIGURE C2.2: TOTAL ELECTRICITY PRODUCTION BY DIFFERENT TECHNOLOGIES IN THE BASIC SCENARIO AND THE ALTERNATIVE SCENARIO IN WHICH ØRSTED (THE FORMER DONG ENERGY) PHASES OUT COAL.



Note: Ørsted (DONG Energy) phasing out coal would eliminate a certain amount of condensing power production. This electricity would then have to be imported instead.

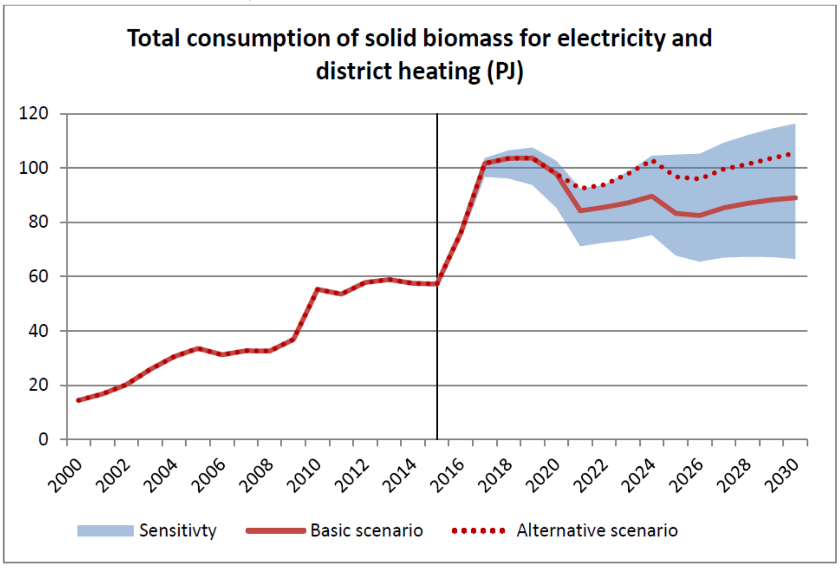
C2.2.1.3.3 Transition increases biomass consumption in the short term

The conversion to biomass will continue up to 2020, both through converting existing coal and natural-gas fired CHP plants and through the deployment of new CHP plants and heating plants. Several conversions and new builds have already been completed or are expected to be completed within the next few years. However, the amount of electricity and heat produced by the converted and new plants, and thereby the amount of biomass they burn, depends on other developments in the electricity and district heating markets.

Consumption of solid biomass will increase from 57 PJ in 2015 to 98 PJ in 2020. In the basic scenario, consumption will then drop to 89 PJ in 2030. This is because at times biomass cannot compete and gets squeezed out of the market by fossil fuels, for example. As illustrated in figure 18, the precise development is uncertain and primarily depends on trends in the price ratio between coal and biomass.

There is a significant difference between the basic scenario and alternative scenario in which DONG Energy's power plants no longer use coal after 2023. In the alternative scenario, biomass consumption will further increase by 106 PJ between 2020 and 2030 - corresponding to about 19% more biomass for electricity and district heating than in the basic scenario.

FIGURE C2.3: CONSUMPTION OF SOLID BIOMASS FOR ELECTRICITY AND DISTRICT HEATING HAS INCREASED UP TO 2017, AFTER WHICH IT WILL BEGIN TO DECREASE FROM 2019.



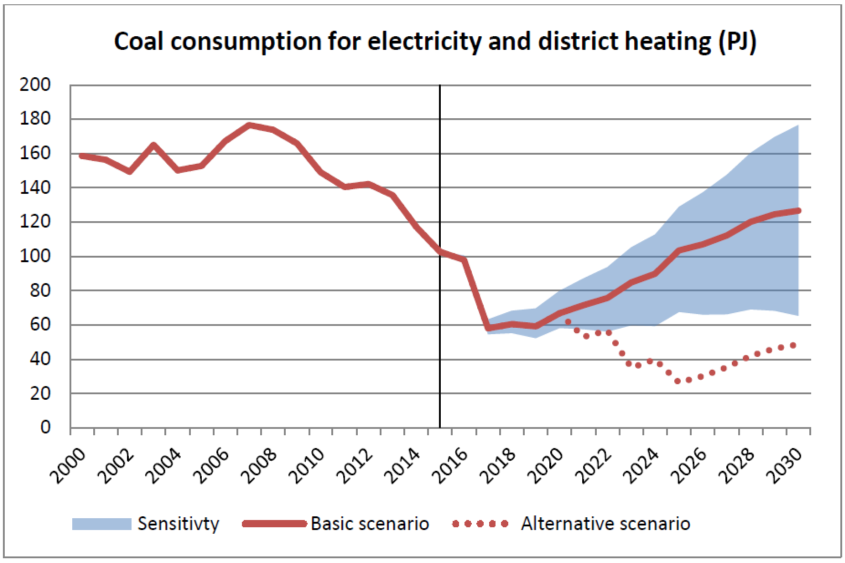
C2.2.1.3.4 Increasing electricity consumption covered by coal or imports.

In the short term, consumption of coal will drop from 103 PJ in 2015 to 61 PJ in 2018. This trend will mainly be a result of the conversion from coal-fired plants to biomass-fired plants. There is uncertainty regarding large-scale power plants after 2020. The basic scenario assumes that it will be possible to use existing coal-fired plants throughout the entire period. This is not considered an option in the alternative scenario.

In the basic scenario, increased electricity consumption for new data centres, in particular, coupled with the discontinuation of subsidies for onshore wind in 2018, will result in coal-fired plants becoming increasingly responsible for Denmark's electricity production after 2018. This development will continue up to 2030 due to the assumption of no new policy in the projections. In 2030, coal consumption will rise to 127 PJ, almost 23% higher than the current consumption. However, this development is extremely uncertain.

Increasing electricity consumption will create the financial basis for coal-fired plants, that otherwise were not intended to be in operation, to come into operation in the projections. This is an important factor behind increasing coal consumption. However, this development would be markedly different if power plants owned by Dong Energy, which are able to increase production of coal-based electricity, choose not to. In this scenario, coal consumption would increase by far less than in the basic scenario, and increasing electricity consumption would be covered by imports to a much higher degree.

FIGURE C2.4: COAL CONSUMPTION FOR ELECTRICITY AND DISTRICT HEATING GREATLY DEPENDS ON WHETHER IT IS POSSIBLE TO CONTINUE USING DONG'S EXISTING COAL-FIRED PLANTS.



Note: Decreasing coal consumption is replaced by electricity imports in the alternative scenario.

C2.2.1.4 What we did

Electricity and district heating production have been calculated on the basis of the Danish Energy Agency's RAMSES model. RAMSES is a simulation model, which calculates the electricity and district heating production plant by plant in time intervals down to one hour. Fuel consumption, environmental impacts and financial aspects are also calculated for the individual plants, as well as electricity prices for the countries included and cross-border electricity trade between them. The model does not include calculations on new investments and capacity is therefore exogenously included in the model.

Denmark, Norway, Sweden, Finland, Germany, the Netherlands, the United Kingdom and France are part of RAMSES. Countries outside the model, to which there are electrical connections, are modelled using cross-border electricity given exogenously.

More information is available in the background report.

An important result of the calculations is the expected developments in electricity prices on the spot market. These developments are significant for the financial framework of Danish electricity producers and the expected costs in connection with renewable technology subsidies. The projections for electricity prices are described in a separate document which was published in the same week as the Outlook.

On the basis of the calculated developments, expectations for subsidy costs for renewables etc., will also be drawn up in the PSO Outlook. This will be published as a separate document in extension of this Outlook.

C2.2.2 Energy consumption by the business sector

C2.2.2.1 Main points

• The energy efficiency of the business sector will improve up to 2020. Furthermore, the final energy consumption of the business sector will remain unchanged during this period, while the economy will see growth.

• From 2020 to 2030, final energy consumption will increase by 20%. The increase will be greater than economic growth, partly because new data centres and the phase-out of public service obligation tariffs will result in a sharp 35% increase in electricity consumption, and partly because the energy efficiency of the business sector will fall because energy savings efforts by energy companies will end after 2020 (due to the frozen-policy assumption applied in projections).

• The consumption of fossil fuels by the business sector will increase by around 5% between 2015 and 2030. This overall increase involves a drop of around 10% up to 2020 followed by an increase of around 15% between 2020 and 2030.

C2.2.2.2 Introduction

Energy consumption by the business sector today amounts to about 30% of total Danish final energy consumption. Historically, manufacturing industries have accounted for almost half of energy consumption by the business sector, but since 2000 energy consumption by this sector has fallen and today it accounts for about 40%. Furthermore, the service sector also accounts for 40%, while agriculture, fisheries and building and construction account for the remaining 20% of energy consumption.

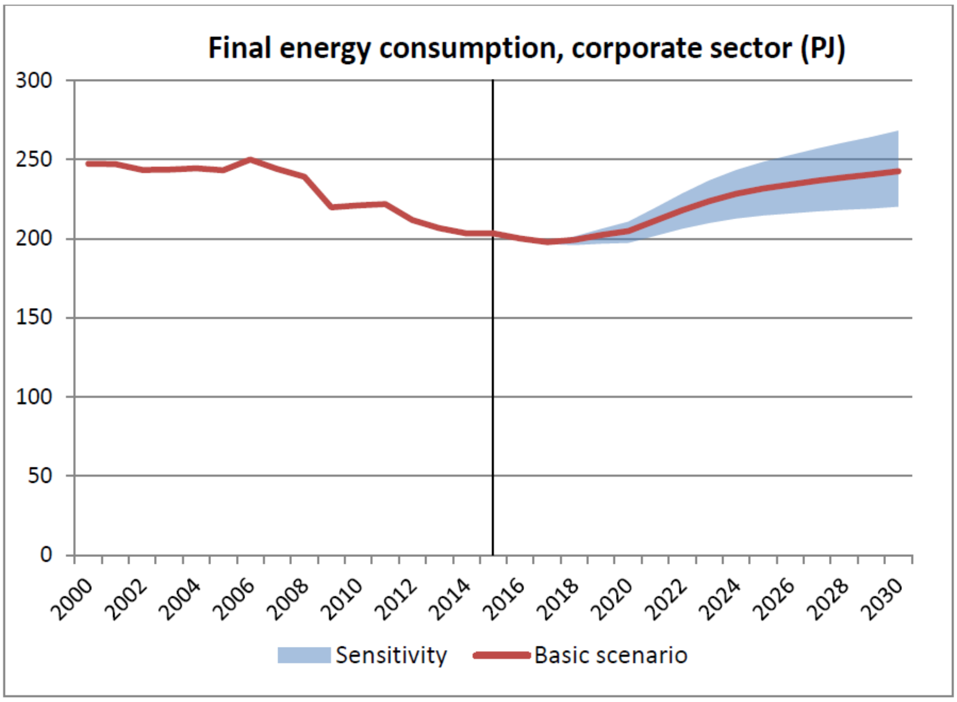
The fall in energy consumption by manufacturing industries is due, in particular, to a decline in production, which was particularly evident during the financial crises from 2007 to 2010. During this period there was a drop in economic growth in industry of almost 5% annually, and this led to a more or less corresponding drop in energy consumption. In agriculture, energy consumption fell by around one-fifth from 2000 to 2015. Energy consumption by the service sector remained almost constant during from 2000 to 2015.

Seen over the past 15 years, energy consumption by the business sector has seen minor changes: the share of fossil fuels has gone down while the shares of electricity, renewable energy and district heating have gone up. The fossil fuel share was 40% in 2015 as opposed to 48% in 2000, and the natural gas share of the fossil fuel share increased over the same period. The renewable share in the business sector increased from 4% in 2000 to 7% in 2015.

C2.2.2.3 Developments in energy consumption by the business sector up to 2020 and 2030

Business sector final energy consumption will remain at the same level as in 2015 up to 2020. During this period, there will be economic growth; however, final energy consumption is projected to remain unchanged nonetheless due to improved efficiency.

FIGURE C2.5: TOTAL FINAL ENERGY CONSUMPTION BY THE BUSINESS SECTOR IS EXPECTED TO REMAIN AT THE 2015 LEVEL UP TO 2020, AFTER WHICH TIME IT WILL INCREASE BY NEARLY 20% UP 2030.

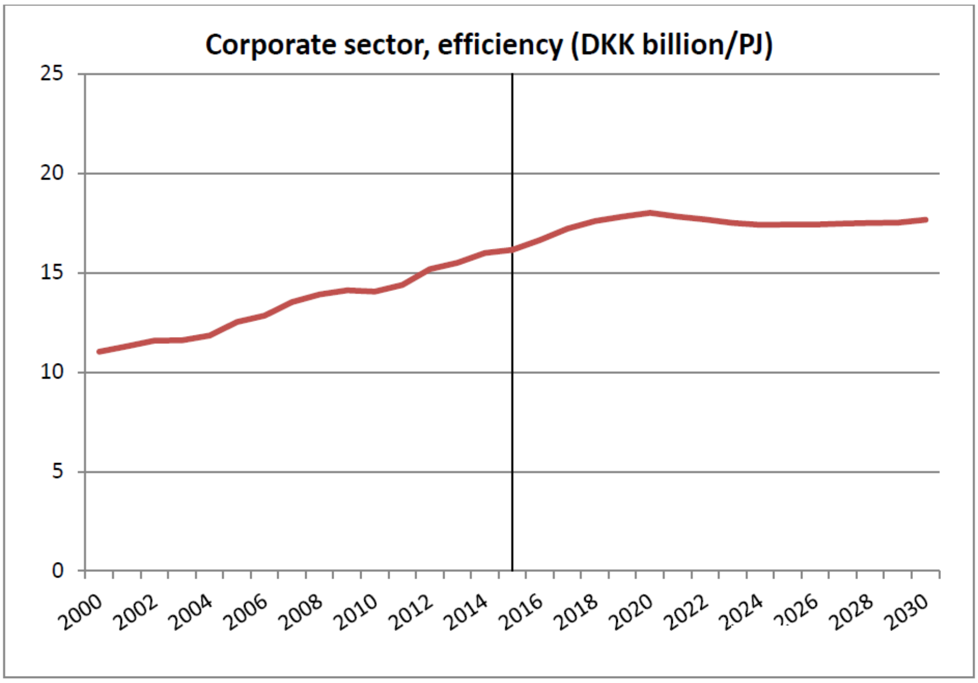


The projected increased efficiency in the business sector from 2015 to 2020 will largely be due to the energy savings that the energy companies are obligated to realise during the period. However, EU standards for products and tightened requirements for the energy efficiency of buildings will also play a part.

Final energy consumption will increase from around 200 PJ in 2020 to around 240 PJ in 2030, corresponding to an annual increase of 1.7%. This increase will be due to economic growth, the establishment of data centres with large electricity demand, as well as lower electricity prices as a result of discontinuation of the public service obligation tariffs. Furthermore, the assumption of no new political agreement regarding the energy saving efforts of energy companies after 2020 (frozen-policy approach) means that there will be no more energy efficiency improvements in this context. As mentioned in the footnote in section 1.3, a possible EU commitment for the period after 2020 has not been included.

The energy efficiency of the business sector can be estimated as the production value created per energy unit spent. Some types of industry - so-called energy-intensive industries - have a significantly greater demand for energy than others. There are generally large differences between manufacturing industries and the service sector: Manufacturing industries have an efficiency of DKK 7.2 billion output per PJ (2015); whereas the private service sector has an efficiency of DKK 22.1 billion per PJ.

FIGURE C2.6: IMPROVEMENTS IN ENERGY EFFICIENCY WILL CONTINUE TO INCREASE UP TO 2020. AFTER 2020, ENERGY EFFICIENCY IMPROVEMENTS WILL COME TO A STANDSTILL.



Energy consumption by the business sector would increase even more throughout the projection period if not for the continued effect of energy saving efforts by energy companies up to 2020, the EU minimum requirements for the energy efficiency of products (ecodesign requirements) and the tightened energy efficiency requirements on buildings (the Danish building regulations). The effect of ecodesign requirements and the building regulations will increase over the period from 2020 to 2030, while the effect of energy saving efforts by energy companies (up to 2020) will wane.

Parts of the business sector, primarily the manufacturing industries, are covered by the EU Emissions Trading System (ETS). With the low CO_2 price level currently anticipated for the projection period, the ETS will have a relatively minor role to play for business sector energy consumption.

C2.2.2.3.1 Electricity consumption will rise significantly, and consumption will increase for all energy types

Electricity consumption by the business sector will grow by 35% in the period 2015 to 2030. This increase will be due, in particular, to the commissioning of data centres, but also to the phase-out of public service obligation tariffs. Disregarding electricity consumption by data centres, the increase in electricity consumption will be 10%. This increase would have been twice as high without the EU energy efficiency requirements on products. Product standards are the energy saving measure that will have the largest effect on electricity consumption, not least after 2020 when the energy saving obligation of energy companies is no longer included in the projections.

Furthermore, there will be an increase in consumption of all energy types by the business sector during the projection period. Consumption of fossil fuels will increase by around 5%, reflecting a fall of up to 10% between 2015 and 2020 and an increase of around 15% between 2020 and 2030. The increase in fossil fuel consumption after 2020 is primarily attributable to the discontinuation of the energy saving obligation of energy companies.

With the increase in energy consumption, there will be less change in fuel mix over the projection period. Electricity consumption accounts for 36% of final energy consumption by the business sector in 2015; a share that will increase to 40% in 2030. The share of renewable energy in the business sector will remain fairly constant throughout the projection period. The fossil fuel share will fall from a 40% share of final energy consumption by the business sector in 2015 to an around 35% share in 2030. The shift in the fuel mix will be due, in particular, to a relatively sharper increase in electricity consumption as a result of the establishment of data centres.

C2.2.2.4 What we did

We projected the energy consumption of the business sector using the EMMA consumption model. EMMA is a macro-economic tool which describes business and household energy demand on the basis of production, energy prices and developments in energy technology. EMMA is linked to the ADAM macro-economic model, which provides assumptions about economic growth. The Danish Energy Agency applies growth assumptions from the Danish Ministry of Finance in the projections.

More information is available in the background report.

C2.2.3 Energy consumption by the transport sector

C2.2.3.1 Main points

• Up to 2030, energy consumption for transport is projected to remain more or less unchanged.

• Seen across the whole projection period, the number of road transport kilometres will increase; however, more energy efficient cars will ensure more or less constant energy consumption.

• Electrification of road transport will only play a limited role for total energy consumption by the transport sector up to 2030; however, it will win a substantial market share of the sale of new cars during the final years of the projection period.

• Fossil fuels will be dominant in transport and will account for 92% of energy consumption in 2030, as opposed to 95% today.

• Energy consumption by air transport will increase by around 12% during the period as a consequence of increased demand.

C2.2.3.2 Introduction

Energy consumption by the transport sector today amounts to about one-third of total Danish final energy consumption, and is almost entirely composed of fossil fuels (95%). The sector includes road transport, rail transport, aviation, domestic shipping as well as energy consumption by the military for transport purposes. Road transport today accounts for 75% of energy consumption, followed by aviation, which accounts for 19%, of which 97% is international air transport. With regard to road transport, cars account for more than 63% of energy consumption, vans and lorries account for 18%, and 14%, respectively, while busses and motorcycles account for the remaining 5%.

Energy consumption increased steadily until the economic crisis in 2008, which coincided with a greater focus on energy efficient cars. Together, this resulted in a drop in overall energy consumption.

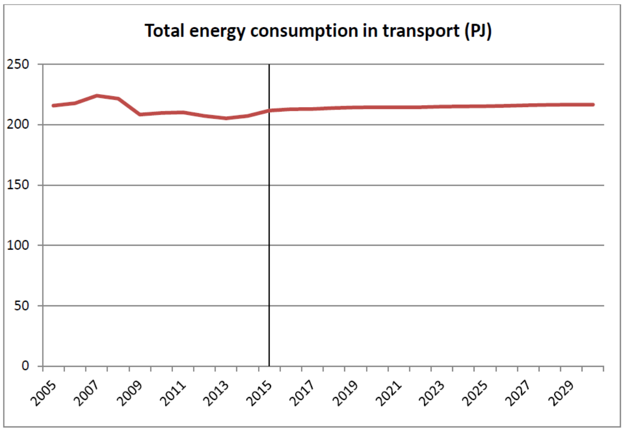
Within the past couple of years, however, energy consumption by road transport has again seen an increase. This is due mostly to an increase in the sale and use of small petrol-driven cars and medium diesel-driven cars, which has resulted in an increase in the overall number of cars and passenger-kilometres.

C2.2.3.3 Developments up to 2020 and 2030

Total energy consumption by the transport sector will remain fairly constant throughout the projection period. There will be an increase in energy consumption by around 1% up to 2020 compared with today. Post-2020, energy consumption will increase by an additional 1% from 2020 to 2030.

The development in energy consumption by the transport sector over the projected period will be driven primarily by transport performance[1], which is expected to increase continuously; however, which will be compensated for by a gradual improvement in the energy efficiency of vehicles. The increase in transport performance will therefore be more or less balanced out by increasing energy efficiency, so that total energy consumption remains constant. The slight increase projected can be attributed to increased energy consumption in air transport, transport by lorries and transport by vans, in the order stated. Energy consumption by international air transport is expected to increase by 12% up to 2030. A fall of around 5% in energy consumption by cars throughout the projection period due to more efficient cars will halve the overall increase from these transport vehicles.

FIGURE C2.7: TOTAL ENERGY CONSUMPTION BY THE TRANSPORT SECTOR WILL REMAIN FAIRLY CONSTANT IN THE PROJECTION PERIOD.



[1] "transport performance" is the number of kilometers driven for each type of transport vehicle (car, bus, van, train, etc.)

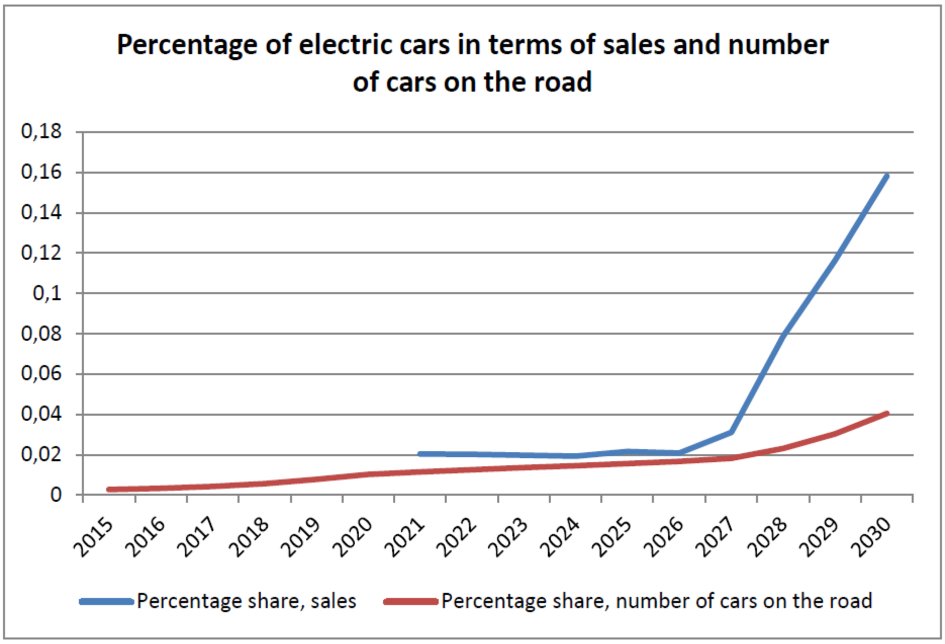
Due to the basic frozen-policy premise of the projections, the share of biofuels is assumed to remain at the current level throughout the period projected. Biofuel blending in 2020, coupled with other renewables in transport, will therefore not be enough to ensure that Denmark meets its commitment to the EU with regard to the use of renewable energy in transport (see the Renewable Energy Directive).

C2.2.3.3.1 Electrification of road transport will play a very limited role up to 2030

Electrification of road transport will play a very limited role up throughout the projection period. Thus, electricity for road transport will make up only 0.8% of energy consumption by road transport in 2030, despite relatively rapid growth from 2025. The rapid phase-in after 2025 can be explained by the expected cheaper prices of electric cars as a result of technological advances, and this will lead to the electric car becoming an attractive option for a wider group of buyers by around 2025, making it competitive with conventional cars.

Assuming no new policy is introduced, electrification of road transport will leave a relatively limited mark on energy consumption within a 2030 horizon. This is because sales are not expected to gather momentum until 2025 and because it will take a long time to replace the total number of cars on the road due to the relatively long lifespan of cars. Despite substantial shares of electric cars in new sales in 2030, it will take several years before this trend is visible in the total number of cars on the road. This can be seen in the figure below.

FIGURE C2.8: PERCENTAGE OF ELECTRIC CARS IN TERMS OF SALES AND NUMBER ON THE ROAD IN THE PROJECTION PERIOD.



Note: As can be seen, the transition to electric cars is sluggish due to the relatively long lifespan of cars. The model used to project sales of electric cars from 2021-2030 is still under development. Therefore, the estimates of electric car sales are very uncertain.

Electrification should therefore be considered as a development with only a gradual effect. In the long term, however, it could have a very significant effect once it breaks through. Note that assumptions regarding the fall in prices of electric cars and the subsequent growth in sales are associated with a high degree of uncertainty. See the background report on sensitivity calculations.

In addition to electricity, hydrogen and biogas can also play a role in the transition from fossils fuels to renewable energy. However, these fuels play a much more minor role than electricity in the projections and will therefore not be discussed further here.

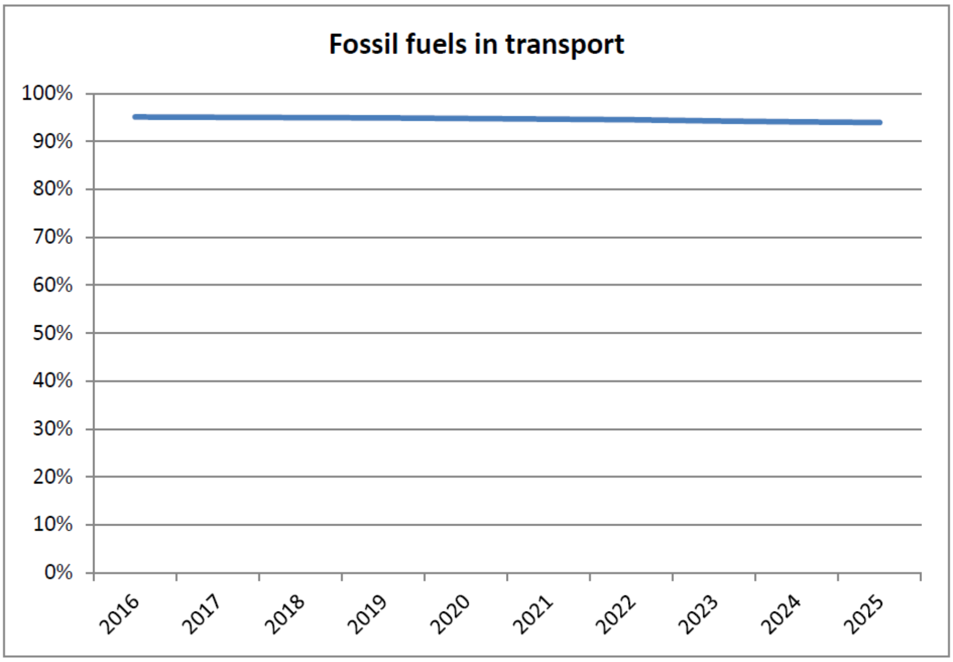
C2.2.3.3.2 Fossil fuels expected to account for over 90% of energy consumption in 2030

The challenge of ensuring increased independence from fossil fuels in the transport sector will remain mostly unchanged in terms of absolute energy consumption. The share of fossil fuels in total energy consumption by the transport sector will fall slightly during the projection period from 95% to 92%. The continued electrification of railways will be most significant in this decrease. The electrification of road

transport and the assumed minor use of biofuel blends in aviation fuels up to 2030 will also contribute to the decrease.

However, it should be noted that, due to the frozen-policy approach, the projections assume that biofuel blending for road transport will not increase up to 2020 as a possible consequence of Denmark's commitments under the Renewable Energy Directive. Developments are illustrated in the figure below.

FIGURE C2.9: SHARE OF FOSSIL FUELS IN ENERGY CONSUMPTION BY TRANSPORT IN THE PROJECTION PERIOD.



C2.2.3.3.3 Rising energy consumption for air transport

Energy consumption by air transport is governed by the demand for air travel and developments in energy efficiency. As mentioned above, the rise in demand is higher than growth in energy efficiency, and this will lead to increased energy consumption corresponding to a 12% rise in 2030 compared with today. A 5% rise in biofuel blending in aviation fuels up to 2030 has been assumed on the basis of the industry's own projections. Note that this blending is not on the basis of any statutory requirements, and this increases uncertainty with regard to whether blending will take place. If blending does take place, there will be a 6% annual rise in fossil energy consumption by air transport up to 2030. It is important to note that there is a high degree of uncertainty in the projections of energy consumption for air transport.

C2.2.3.4 What we did

The projections of energy consumption for transport have been based on the Danish Energy Agency's transport model, with considerable input from the Danish Transport and Construction Agency in particular, on developments in transport performance for road transport (based on the Landstrafikmodel (national traffic model)), and on energy consumption by railways.

The transport model projects road transport based on projections for growth in transport performance, developments in energy efficiency for vehicles broken down into 33 vehicle categories and survival rates, and journeys by vehicles as a function of the age of the vehicles. This provides relatively detailed projections for energy consumption by road transport.

Energy consumption by air transport has been based on projections using the PRIMES model's projections of expected growth rates for passenger kilometres and developments in the energy efficiency of aircraft. Simpler projections have been used for the other sectors based on historical developments.

More information about the projections for the transport area is available in the background report.

C2.2.4 Household energy consumption

C2.2.4.1 Main points

• Total final energy consumption by households is expected to fall by almost 8% between 2015 and 2030. This is a fall of 15 PJ and a continuation of the trend from the past nine years.

• Due to improvements in the energy efficiency of existing buildings, the demolition of existing buildings and the establishment of new energy-efficient buildings, the total net space heating demand of households[2] will decrease by up to 8% from 2015 to 2030, even though the total floor area that requires space heating will increase by 10% during the same period.

• Total final energy consumption for heating by households will drop by 10% from 2015 to 2030 due to the fall in net space heating demand as well as due to improvements in the technologies generating the heat. That is, home owners will shift to other, more energy-efficient sources of heat; e.g. oil-fired and gas-fired boilers replaced by electricity-driven heat pumps.

• In 2030, heat pumps are expected to cover around 15% of the net space heating demand of households; the share was around 7% in 2015.

• Electricity consumption by household appliances will remain unchanged throughout the projection period as efficiency improvements will offset the growth in the number of household appliances.

C2.2.4.2 Introduction

Energy consumption by households today amounts to about 30% of total Danish final energy consumption. A total of 83% of the final energy consumption of households is spent on heating, and the remaining 17% on household appliances.

Energy consumption for heating has remained at a fairly constant level throughout the past 15 years, but there have been significant changes in the energy sources used. The number of oil-fired boilers has been reduced significantly, so that, in 2015, oil consumption for heating by households was approximately one-third of consumption in 2000.

Despite a rising number of household appliances, the associated electricity consumption has remained more or less constant over the past 15 years because household appliances have become considerably more efficient. This continuous energy efficiency improvement has primarily been driven by EU standards for products (ecodesign requirements) and EU energy labelling requirements.

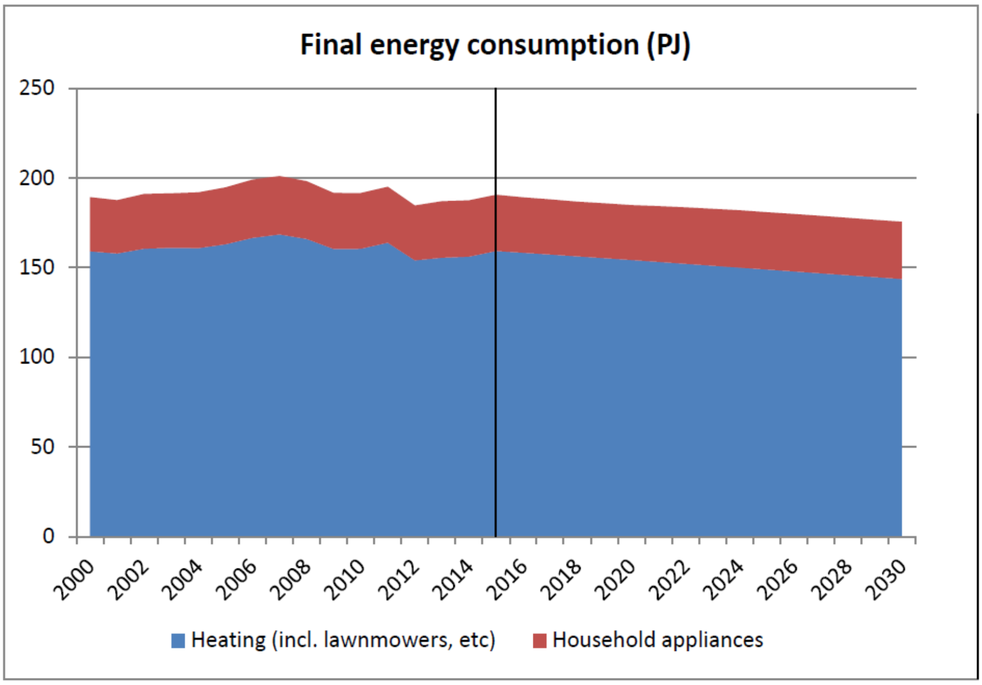
C2.2.4.3 Developments in final energy consumption by households up to 2020 and 2030

Continued growth in private consumption during the projection period is expected to result in an increase in the number of appliances and total heated area; however, energy efficiency improvements are also projected to take place, even under the frozen-policy assumption, e.g. as a consequence of technological progress.

[2] Net space heating demand is a measure of the heating required to heat a building (i.e. both space heating and hot water). Final energy consumption which is used to meet the net space heating demand, is typically higher because of losses e.g. from boilers when producing the heat.

The total final energy consumption of households is expected to be around 8% lower in 2030 than today. Thus, gross energy consumption was at 190 PJ in 2015 and is expected to be around 185 PJ in 2020 and 175 PJ in 2030. This accounts for unchanged electricity consumption by appliances and a drop in energy consumption for heating.

FIGURE C2.10: TOTAL FINAL ENERGY CONSUMPTION OF HOUSEHOLDS FOR HEATING ETC. AND OF HOUSEHOLD APPLIANCES IS EXPECTED TO FALL BY AROUND 8% FROM 2015 TO 2030.



C2.2.4.3.1 Improvements in the energy efficiency of buildings will reduce energy consumption for heating

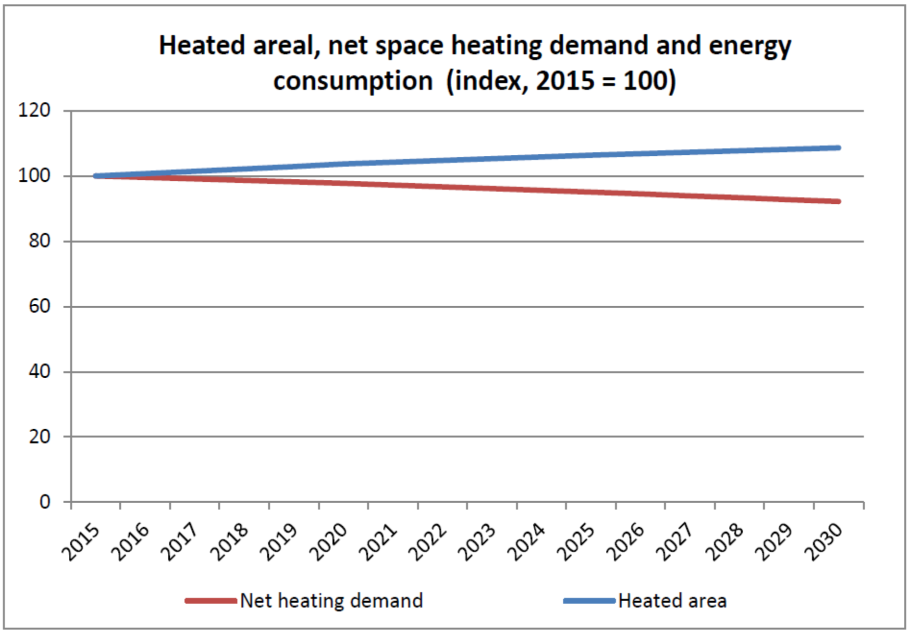
A steady increase in the demand for housing as a consequence of an increasing population and demands for larger homes will affect the total heated area. Total living floor space is projected to increase by around 9% by 2030, and it is anticipated that around 96% of the total existing floor space in 2015 will remain in 2030. Overall, the projections show an annual growth of 0.6% in the total heated area.

Despite an increase in total heated area, the net space heating demand is expected to drop from around 136 PJ in 2015 to around 125 PJ in 2030. This drop will be due to a higher degree of energy efficiency in new buildings but, more so, due to energy efficiency improvements in existing buildings. The net energy

consumption for heating residential buildings will be the result of various instruments such as tightening the building regulations and energy savings efforts by energy companies up to 2020.

The energy requirements for new buildings in the Danish building regulations were tightened by 25% with effect from 2016 (Building Regulations 2015). Moreover, the 2008 Energy Agreement includes an agreement to tighten energy requirements by an additional 25% for buildings erected after 2020. The requirements in the building regulations apply to new as well as existing buildings. New buildings must be built to comply with the tighter requirements, whereas existing buildings must observe a number of energy efficiency requirements for components when they are renovated. These requirements are assumed to be observed on a large scale; however, some comfort improvements are also assumed to take place in connection with refurbishments (rebound effect).

FIGURE C2.11: THE TOTAL HEATED AREA IS LIKELY TO INCREASE STEADILY UP TO 2030, WHEREAS THE NET SPACE HEATING DEMAND WILL FALL OVER THE PERIOD AS A RESULT OF MORE EFFICIENT BUILDINGS.



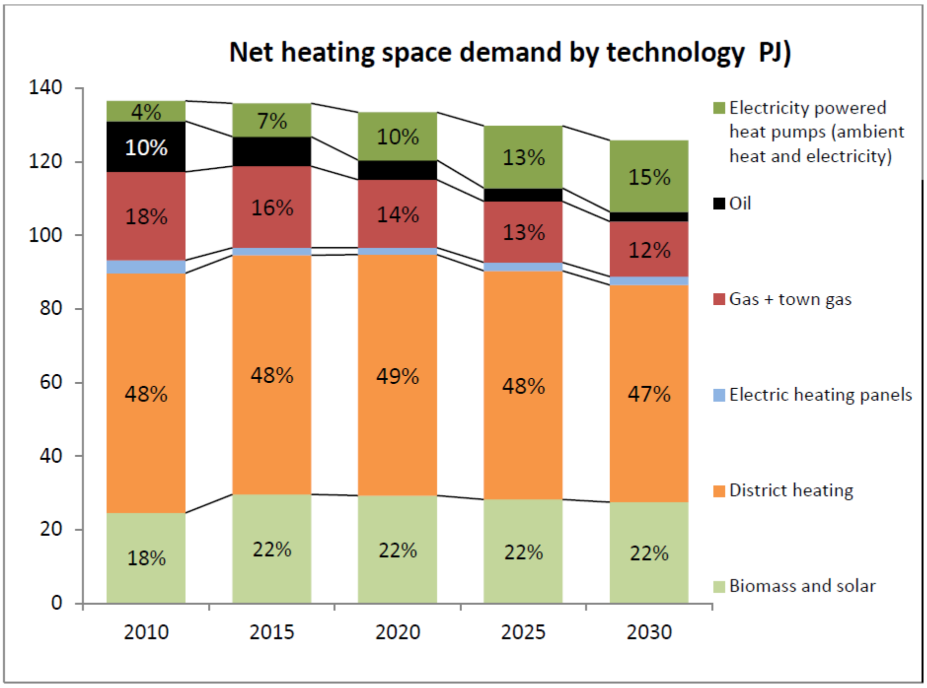
C2.2.4.3.2 Decline in final energy consumption for heating up to 2030

Final energy consumption for heating residential buildings will fall by around 10% over the projection period. This fall exceeds the fall in net space heating demand because the efficiency of heating technologies, i.e. the amount of energy output relative to energy input, will increase by around 2 percentage points over the period. Average efficiency will improve as a result of households changing to more energy efficient heating sources. The improved efficiency will be due partly to ongoing tightening of EU energy efficiency requirements (ecodesign requirements) and EU energy labeling requirements, which also apply to heating technologies. The efficiency improvements will also be due to expected general technological advances.

Final energy consumption includes ambient heat for heat pumps. However, surrounding heat can be considered free energy. If ambient heat is not included, the decline in consumption will be even greater, as energy consumption will go from being based on fossil fuels (oil and natural gas) to being based on electrically powered heat pumps, see Figure 10. Heat pumps consume only about one-third of the energy (electricity) used by conventional boilers (oil, natural gas and biomass). The surrounding heat exploited by heat pumps is included in the renewable energy share.

The mix of energy types used to cover the net heating demand in homes will change from 2015 to 2030. The share of the net heating demand covered by heat pumps will increase from its current level of 7% to 15% in 2030. Conversely, the share of natural gas and oil will decline over the period. The share of the net heating demand covered by district heating amounts to almost 50% and will remain unchanged over the period. The share of biomass will also remain unchanged over the period, and covers approx. 20% of the heating demand.

FIGURE C2.12: THE PROJECTED DECLINE IN NET HEATING DEMAND REFLECTS A DECLINE IN ALL TECHNOLOGIES, EXCEPT HEAT PUMPS, WHICH SEE AN INCREASE OVER THE PERIOD.



C2.2.4.3.3 More household appliances in Danish homes; but they will be more energy efficient

Electricity consumption by household appliances will remain unchanged throughout the projection period. Due to growing private consumption, people will invest in more household appliances. However, at the same time the energy efficiency of these appliances will improve throughout the projection period as a consequence of the continuous tightening of EU minimum requirements for energy efficiency (ecodesign requirements)[3] and tighter EU energy labelling requirements[4], including that a greater number of products will be covered by the requirements. The effects of these regulatory requirements were analysed in 2013[5]. In 2030, efficiency improvements will amount to almost 20% of total

[3] In order to reduce the energy consumption of various products, the EU has imposed requirements (i.e. ecodesign requirements) to ensure that the least energy efficient products are removed from the market. The Ecodesign Directive is the legislative basis for introducing ecodesign requirements on products and appliances.

[4] Since 1995, EU requirements have been introduced for energy labelling of a number of products. Today, there are requirements on e.g. domestic appliances, lighting, boilers and heat pumps. The energy labelling is known as the A to G label scale.

[5] ”Effektvurdering af ecodesign og energimærkning” (Impact Assessment of Ecodesign and Energy Labelling), prepared by IT-Energy and Viegand Maagøe for the Danish Energy Agency in 2013.

electricity consumption by household appliances, compared with a scenario without regulatory requirements.

C2.2.4.4 What we did

The projection of household energy consumption was partly completed in the EMMA consumption model, and partly in the Danish Energy Agency's version of the TIMES-DK model. EMMA is a macro-economic tool which describes corporate and household energy demand on the basis of production, energy prices and developments in energy technology. EMMA is linked to the ADAM macro-economic model, which provides assumptions about economic growth. The Danish Energy Agency uses growth assumptions from the Danish Ministry of Finance. We used the TIMES-DK model to calculate energy consumption for heating by households. We used this in combination with assessments of inertia in behavioural change and the significance of energy saving efforts. The TIMES-DK model is in effect a complete energy system model; however, for these projections we only used the part of the model that concerns space heating by households.

Annex C3 A comparison of the latest reported greenhouse gas inventory with the "with measures" projections of Denmark's total greenhouse gas emissions included in Denmark's first to seventh national communication

This annex contain information on a comparison of the latest reported greenhouse gas inventory with the "with measures" projections of Denmark's total greenhouse gas emissions included in Denmark's first to seventh national communication.

In Figure C3.1 the "raw" data for projections of Denmark's total greenhouse gas emissions without LULUCF from NC1(1994), NC2(1997), NC3(2003), NC4(2005), NC5(2009), NC6(2013) and NC7(2017) are shown together with Denmark's total greenhouse gas emissions in the inventory re-submitted in May 2017 for the period 1990-2015. As it can been seen no clear conclusion can be drawn from this figure.

However, if the data are normalised to take into account the improvements made in inventory reporting over the same period, the deviations in historic data are diminished as shown in Figure C3.2.

In figure C3.3 also inter-annual variations in temperature and electricity trade is taken into account as CO_2 emissions in Denmark from heat and electricity production are highly sensitive to inter-annual variations in unpredictable climate parameters such as temperature and precipitation, the latter primarily precipitation in Norway and Sweden due to these countries' hydro power based production of electricity for the Nordic electricity market.

Figure C3.3 shows:

- a good correlation between the inventory data and the projection until 2005 in NC1, the projection until 2010 in NC2, and the projection until 2015 in NC6, and

- a significant deviation in the projections for 2015 in NC3, NC4 and NC5 from the inventory data for 2015.

A closer look into the detailed level of sectors and source categories in the projections in NC1 and NC2, however, reveal major differences. But outliers in both directions seem to even out each other in the total due to the relatively high number of separately projected sub-categories.

FIGURE C3.1 "RAW" DATA FOR PROJECTIONS OF DENMARK'S TOTAL GREENHOUSE GAS EMISSIONS FROM NC1(1994), NC2(1997), NC3(2003), NC4(2005), NC5(2009), NC6(2013) AND NC7(2017) SHOWN TOGETHER WITH DENMARK'S TOTAL GREENHOUSE GAS EMISSIONS IN THE INVENTORY RE-SUBMITTED IN MAY 2017 FOR THE PERIOD 1990-2015 (KT CO_2 EQUIVALENT).

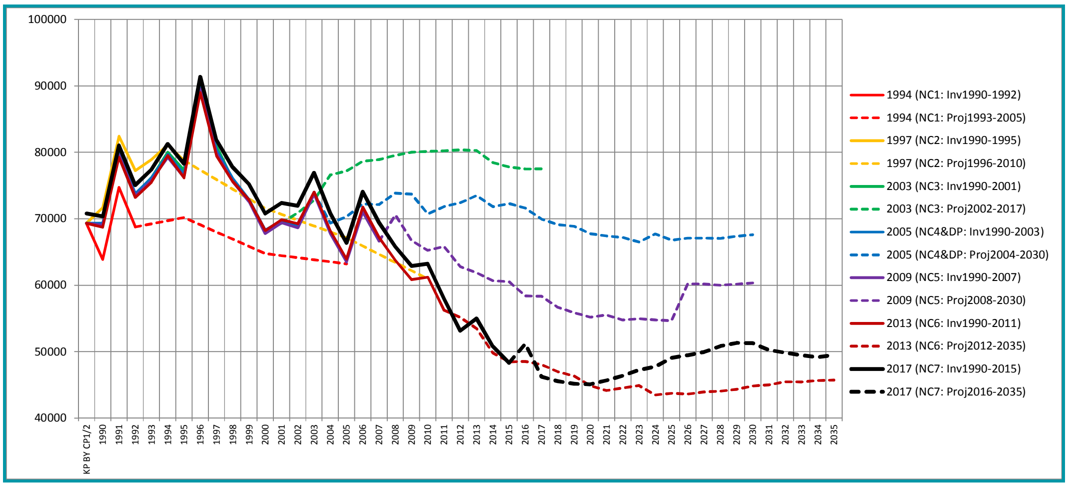


FIGURE C3.2 THE DATA SHOWN IN FIGURE C4.1 NORMALISED TO TAKE INTO ACCOUNT THE IMPROVEMENTS MADE IN INVENTORY REPORTING FROM 1992 TO 2017 (KT CO_2 EQUIVALENT).

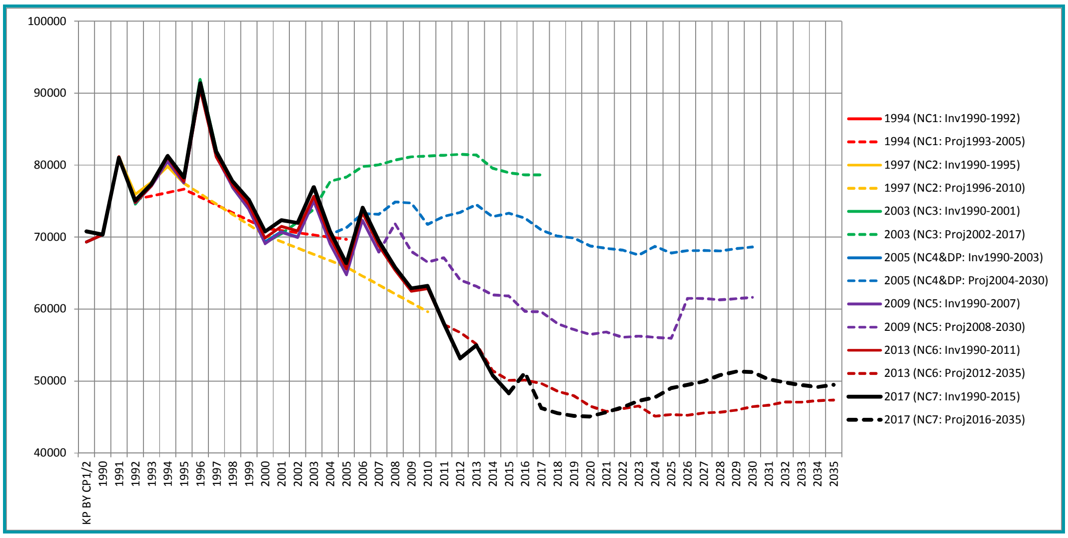
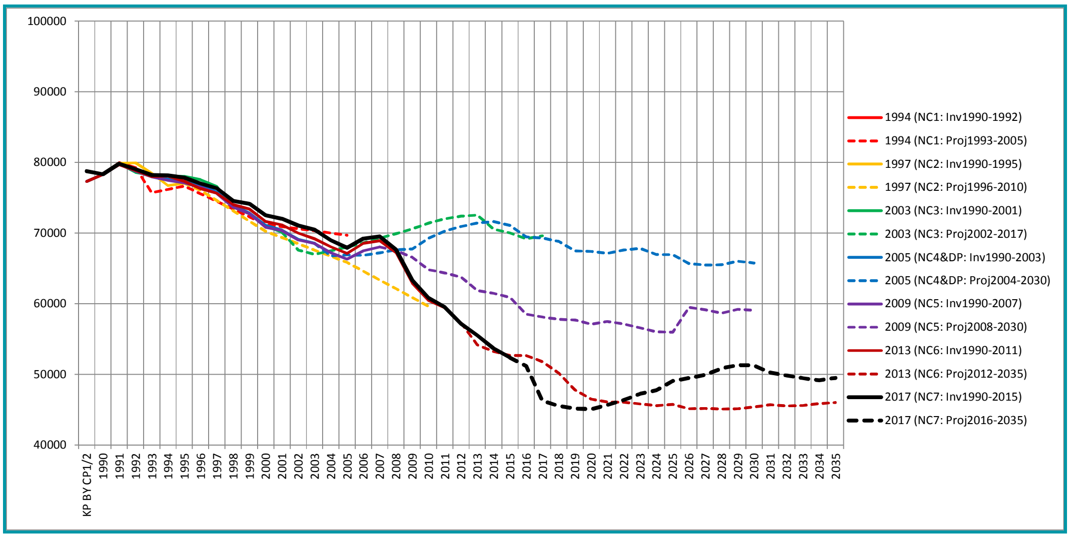


FIGURE C3.3 THE DATA SHOWN IN FIGURE C4.2 WITH ALSO INTER-ANNUAL VARIATIONS IN TEMPERATURE AND ELECTRICITY TRADE TAKEN INTO ACCOUNT (KT CO_2 EQUIVALENT).



Annex D Support information

This annex contains the following information:

Annex D1: Tables with additional information on support committed and disbursed 2013-2016, technology transfer and capacity building.

Annex D2: Information on the Danish Energy Agency Energy Partnership Programme - DEPP.

Annex D3: Description of selected programmes/projects to advance and/or finance transfer of technologies to other countries.

Annex D1 Tables with additional information on support committed and disbursed 2013-2016, technology transfer and capacity building

Contents

2013 CTF Table 7-, 7a- and 7b-formats

2013.1 COMMITTED

2013.1.1 CTF-Table 7-Committed-2013

Allocation channels	2013									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,658,725,739	40,904,815	66,750,000	193,900,000	0	295,340,739	7,283,216	11,885,023	34,524,435	0
Multilateral climate change funds	0	1,580,000	50,000,000	1,600,000	0	0	281,323	8,902,639	284,884	0
Other multilateral climate change funds	0	0	0	0	0	0	0	0	0	0
Multilateral financial institutions, including regional development banks	1,052,328,439	8,324,815	5,250,000	121,600,000	0	187,370,011	1,482,257	934,777	21,651,219	0
Specialized United Nations bodies	606,397,300	31,000,000	11,500,000	70,700,000	0	107,970,729	5,519,636	2,047,607	12,588,332	0
Total contributions through bilateral, regional and other channels		188,198,325	14,350,000	1,142,017,212	0		33,509,236	2,555,057	203,339,347	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		229,103,140	81,100,000	1,335,917,212	0		40,792,452	14,440,081	237,863,782	0
Total climate specific finance		1,646,120,352					293,096,315			

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 5.616312) 5.6163

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2013.1.2 CTF-Table 7a-Committed-2013

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2013[a]

Donor funding	Total amount				Status[b, 3]	Funding source[4]	Financial instrument[5]	Type of support[6]	Sector[c, 7]
	Core/general[d, 1]		Climate-specific[e, 2]		Committed Disbursed	ODA OOF Other[f]	Grant Concessional loan Non-concessional loan Equity Other[f]	Mitigation Adaptation Cross-cutting[g] Other[f]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other[f] Not applicable
	Domestic currency	USD	Domestic currency	USD					
Multilateral climate change funds									
1. Global Environment Facility									
2. Least Developed Countries Fund			50,000,000	8,902,639	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities			1,600,000	284,884	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
UNFCCC Trust Fund for Supplementary Activities			1,580,000	281,323	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
7. Other (Multilateral Fund for the Implementation of the Montreal Protocol)									
Subtotal	**0**	**0**	**53,180,000**	**9,468,847**					
Multilateral financial institutions, including regional development banks									
1. World Bank									
World Bank (IDA)	411,320,000	73,236,672			Committed	ODA	Grant		
World Bank (IBRD)			84,100,000	14,974,239	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
2. International Finance Corporation	25,000,000	4,451,320	5,000,000	890,264	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
3. African Development Bank	97,750,231	17,404,701	124,815	22,224	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210
African Development Bank			5,250,000	934,777	Committed	ODA	Grant	Adaptation	Agro-industries / 32161
African Development Bank (AFDF)	280,026,509	49,859,500			Committed	ODA	Grant		
4. Asian Development Bank	133,231,699	23,722,275	8,200,000	1,460,033	Committed	ODA	Grant	Mitigation	Energy manufacturing / 32167
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other									
Other (CGIAR)	105,000,000	18,695,543			Committed	ODA	Grant		
Other (OECD)			7,500,000	1,335,396	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
Other (IEA)			25,000,000	4,451,320	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
Subtotal	**1,052,328,439**	**187,370,011**	**135,174,815**	**24,068,252**					
Specialized United Nations bodies									
1. United Nations Development Programme	330,000,000	58,757,419	11,250,000	2,003,094	Committed	ODA	Grant	Cross-Cutting	Other (89% Environmental policy and administrative management / 41010; 11% Multisector aid / 43010)
United Nations Development Programme			21,000,000	3,739,109	Committed	ODA	Grant	Mitigation	Civilian peace-building, conflict prevention and resolution / 15220
United Nations Development Programme			11,500,000	2,047,607	Committed	ODA	Grant	Adaptation	Democratic participation and civil society / 15150
2. United Nations Environment Programme	85,000,000	15,134,487	33,950,000	6,044,892	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
United Nations Environment Programme			10,000,000	1,780,528	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
3. Other									
Other (United Nations University)			500,000	89,026	Committed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082
Other (UNIDO)	6,397,300	1,139,057			Committed	ODA	Grant		
Other (WFP)	185,000,000	32,939,765							
Other (United Nations General Trust Fund)			4,000,000	712,211	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
Other (United Nations Office for Project Services)			21,000,000	3,739,109	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
Subtotal	**606,397,300**	**107,970,729**	**113,200,000**	**20,155,575**					
Total	**1,658,725,739**	**295,340,739**	**301,554,815**	**53,692,675**					

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.616312) 5.6163

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2013.1.3 CTF-Table 7b-Committed-2013

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2013[a]

Recipient country/ region/project/programme/activity[b]	Total amount: Climate-specific[f, 2]		Status[c, 3]	Funding source[4]	Financial instrument[5]	Type of support[6]	Sector[d, 7]	Additional Information[e]
	Domestic currency	USD	Committed Disbursed	ODA OOF Other[g]	Grant Concessional loan Non-concessional loan Equity Other[g]	Mitigation Adaptation Cross-cutting[h] Other[g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other[g]	
Afghanistan	39,000,000	6,944,059	Committed	ODA	Grant	Mitigation	Rural development / 43040	CRS 2013001246 / Support to National Solidarity Programme (NSP)
Afghanistan	36,000,000	6,409,900	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2013001248 / Support to DACAAR
Asia, regional	1,169,074	208,157	Committed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	CRS 2013001225 / CSR-facility: Fashion Links - Access to Sustainable Production
Bangladesh	10,000,000	1,780,528	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2013001119 / Climate Change Adaptation Pilot Project
Benin	4,350,000	774,530	Committed	ODA	Grant	Adaptation	Road transport / 21020	CRS 2011001530 / Financial support for the Ministry of Transport and Roads Fund
Bolivia	48,000,000	8,546,534	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2013001339 / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	94,000,000	16,736,962	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001340 / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
China (People's Republic of)	204,452	36,403	Committed	ODA	Grant	Mitigation	Energy generation, non-renewable sources – unspecified / 2331(	CRS 2006001418 / Changchun District Heating Project, Jilin Province
Developing countries, unspecified	750,000	133,540	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2009002499 / PPP: Max Havelaar Contract
Developing countries, unspecified	57,500,000	10,238,035	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2013001009 / Rammeaftale med Folkekirkens Nødhjælp
Developing countries, unspecified	56,500,000	10,059,982	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2013001010 / Rammeaftale med Ibis
Developing countries, unspecified	25,000,000	4,451,320	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2013001012 / Rammeaftale med Red Barnet
Developing countries, unspecified	825,025	146,898	Committed	ODA	Grant	Cross-Cutting	Human rights / 15160	CRS 2013001069 / Denmark hosting the annual ASEM Seminar on Human Rights 2013
Developing countries, unspecified	1,196,420	213,026	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001101 / Climate Envelope 2013: Min. of Climate, Energy and Buildings - climate finance meeting in Copenhagen October 2013
Developing countries, unspecified	1,000,000	178,053	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001118 / Climate Envelope 2013: WMO - Workshop for broadcast meteorologists on the IPCCs 'physical science basis' 2013
Developing countries, unspecified	10,000,000	1,780,528	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001139 / IWGIA 2013-2015: Climate change partnership with indiginous peoples in South- and Southeast Asia - pro-poor REDD
Developing countries, unspecified	1,340,860	238,744	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2013001143 / Evaluation of Danida Business-to-Business Programme
Developing countries, unspecified	3,500,000	623,185	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001177 / Rio+20 2013: IUCN - Closing the knowledge-investment gap in drylands
Developing countries, unspecified	5,000,000	890,264	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001178 / Climate Envelope 2013 - World Bank-ESMAP, IEA and IISD - fossil fuel subsidy reform
Developing countries, unspecified	2,000,000	356,106	Committed	ODA	Grant	Cross-Cutting	Energy education/training / 23181	CRS 2013001242 / Rio+20 follow up: Water, Sustainable Energy and advancing the role of business in addressing climate change
Developing countries, unspecified	1,250,000	222,566	Committed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	CRS 2013001280 / CSR-facility. Fairtrade Mærket Danmark Fonden. Fairtrade for all: contribution to fivefold increase the Fairtrade consumption in Denmark by 2020
Developing countries, unspecified	60,000,000	10,683,167	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001290 / Support to Global Water Partnership (GWP) 2013-18 (5 år)
Developing countries, unspecified	7,000,000	1,246,370	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001291 / Rio+20 2013: GWP - Policy dialogue and knowledge generation for water security
Developing countries, unspecified	125,000,000	22,256,598	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001314 / Climate Envelopes 2012 og 2013: IFU - Danish Climate Investment Fund
Developing countries, unspecified	25,000,000	4,451,320	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2013001325 / Climate Envelope 2013: Pro-poor REDD (IUCN), ph. 2
Developing countries, unspecified	30,000,000	5,341,584	Committed	ODA	Grant	Cross-Cutting	Human rights / 15160	CRS 2013001342 / International Work Group for Indigenous Affairs (IWGIA)
Developing countries, unspecified	744,918	132,635	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2013200002 / General contribution to IUCN
Egypt	576,381	102,626	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2007001582 / Zafarana Wind Farm Project, Component III
Far East Asia, regional	2,500,000	445,132	Committed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	CRS 2013001227 / CSR-facility: Let's do it right in Myanmar - supporting strong corporate social and environmental responsibility
Indonesia	79,500,000	14,155,197	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2012001357ab / Environment and climate
Indonesia	2,131,468	379,514	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2013001134 / DBP Tansoputra Asia and Smoke Solution
Indonesia	1,096,143	195,171	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2013001352 / DBP Hyprowira Adhitama and Weel and Sandvig
Mali	55,200,000	9,828,514	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2013001256 / Développement et amélioration des infrastructures (composant 2)
Mali	20,000,000	3,561,056	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2013001257 / Renforcement des capacités et des compétences (composant 3)
Mali	7,000,000	1,246,370	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2013001258 / Études, audits, formation, DFC, suivi et évaluation
Mali	5,000,000	890,264	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2013001259 / Fonds non alloués
Mexico	45,000,000	8,012,375	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2013001337 / Climate Envelope 2013: Climate change mitigation and energy in Mexico
Mozambique	1,250,000	222,566	Committed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213(	CRS 2011001558 / B2B project: Kajovem & Jorton
Mozambique	1,100,000	195,858	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2011001559 / B2B Pilot Project: HelpMultiservice & Kuntkes Holding
South Africa	1,400,000	249,274	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001141 / Private/Public Partnership Project in the Water Sector
South of Sahara, regional	2,499,668	445,073	Committed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	CRS 2013001212 / CSR-Facility: Establishment and implementation of international standards for sustainable and traceable cocoa
South of Sahara, regional	1,250,000	222,566	Committed	ODA	Grant	Mitigation	Trade facilitation / 33120	CRS 2013001326 / Organic Denmark - project identification for the project ECOMEA 'Enhancing the capacity of the organic movements in East Africa'
Tanzania	2,357,000	419,670	Committed	ODA	Grant	Cross-Cutting	Water transport / 21040	CRS 2013001193 / Renewal of Ferry Fleet on Lake Victoria, Lake Tanganyika and Lake Nyasa: Support to Detailed Design and Tendering
Uganda	16,157,000	2,876,799	Committed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002325 / Agribusiness Development Initiative
Uganda	290,500,000	51,724,334	Committed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2013001184 / Sector Budget Support for Rural Water Supply
Uganda	137,500,000	24,482,258	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001353 / Joint Partnership Fund-basket
Uganda	8,000,000	1,424,422	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001354 / Long term technical assistance
Uganda	4,000,000	712,211	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001355 / Administration/review
Uganda	10,000,000	1,780,528	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001356 / Unallocated Funds
Viet Nam	2,039,099	363,067	Committed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213(	CRS 2013001147 / Danish Active House in Vietnam
Viet Nam	2,178,030	387,804	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2013001197 / Vestas and Cong Ly Collaboration on Wind Farm Development in Vietnam
	1,344,565,537							

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.616312) 5.6163

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2013.2 Disbursed

2013.2.1 CTF-Table 7-Disbursed-2013

Allocation channels	2013									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,558,558,681	70,683,833	107,928,750	98,300,000	32,939,449	277,505,716	12,585,453	19,217,015	17,502,589	5,864,961
Multilateral climate change funds	100,000,000	1,567,493	50,000,000	1,600,000	0	17,805,279	279,097	8,902,639	284,884	0
Other multilateral climate change funds	0	0	0	0	6,722,121	0	0	0	0	1,196,892
Multilateral financial institutions, including regional development banks	906,248,765	42,701,989	46,000,000	56,000,000	26,217,328	161,360,118	7,603,208	8,190,428	9,970,956	4,668,068
Specialized United Nations bodies	552,309,916	26,414,350	11,928,750	40,700,000	0	98,340,319	4,703,149	2,123,947	7,246,748	0
Total contributions through bilateral, regional and other channels		321,413,312	94,406,635	566,343,198	0		57,228,536	16,809,364	100,838,984	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		392,097,145	202,335,385	664,643,198	32,939,449		69,813,989	36,026,379	118,341,573	5,864,961
Total climate specific finance		1,292,015,178					230,046,902			

Note : Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation : USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 5.616312) 5.6163

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2013.2.2 CTF-Table 7a-Disbursed-2013

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2013[a]

Donor funding	Total amount: Core/general[d, 1]: Domestic currency	Total amount: Core/general[d, 1]: USD	Total amount: Climate-specific[e, 2]: Domestic currency	Total amount: Climate-specific[e, 2]: USD	Status[b, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[f])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[f])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[g] / Other[f])	Sector[c, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[f] / Not applicable)	Notes for MFA
Multilateral climate change funds										
1. Global Environment Facility	100,000,000	17,805,279			Disbursed	ODA	Grant			
2. Least Developed Countries Fund			50,000,000	8,902,639	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	All core support from multilateral climate funds is counted as climate-specific, except for support to GEF. The DKK 50 mio. in core funding to LDCF in 2013 has been moved accordingly. This is different from BR2, where it is counted as core funding.
3. Special Climate Change Fund										
4. Adaptation Fund										
5. Green Climate Fund										
6. UNFCCC Trust Fund for Supplementary Activities			1,600,000	284,884	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
UNFCCC Trust Fund for Supplementary Activities			1,567,493	279,097	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	
7. Other (Multilateral Fund for the Implementation of the Montreal Protocol)			6,722,121	1,196,892	Disbursed	ODA	Grant	Other (NA)	Environmental policy and administrative management / 41010	All core support from multilateral climate funds is counted as climate-specific, except for support to GEF. The DKK 6.7 mio. in core funding to Montreal Protocol has been moved accordingly. This support did not figure in BR2, but support to Montreal Protocol is included in DK's MMR reporting in 2015 and 2016, and has therefore been included here.
Subtotal	**100,000,000**	**17,805,279**	**59,889,614**	**10,663,513**						
Multilateral financial institutions, including regional development banks										
1. World Bank										
World Bank (IDA)	411,320,000	73,236,672			Disbursed	ODA	Grant			DKK 81 mio. in core support to IDA Multilateral Debt Relief Initiative is not included in the core support to the World Bank in BR2. We suggest they are also not included here.
World Bank (IBRD)			25,000,000	4,451,320	Disbursed	ODA	Grant	Cross-Cutting	Other (60% Environmental policy and administrative management / 41010; 40% Livestock/veterinary services / 31195)	
World Bank (IBRD)			41,000,000	7,300,164	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	
World Bank (IBRD)			6,038,924	1,075,247	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	
2. International Finance Corporation	12,500,000	2,225,660	1,000,000	178,053	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	The DKK 1 mio. for climate-specific support to IFC is not included in the 2013 reporting in BR2. Core support to IFC is in BR2 added to the overall WB support, but since it is seperated in the table from UNFCCC we have also seperated it here.
3. African Development Bank	97,750,231	17,404,701	5,000,000	890,264	Disbursed	ODA	Grant	Adaptation	Agro-industries / 32161	
African Development Bank			17,663,065	3,144,958	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	
African Development Bank (AFDF)	280,026,509	49,859,500			Disbursed	ODA	Grant			
4. Asian Development Bank	33,307,925	5,930,569			Disbursed	ODA	Grant			
5. European Bank for Reconstruction and Development			19,000,000	3,383,003	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	
6. Inter-American Development Bank										
7. Other (CGIAR)	35,000,000	6,231,848			Disbursed	ODA	Grant			The DKK 35 mio. in core support to CGIAR are not included in the BR2 reporting, but since it is included in MMR 2015 and 2016, we suggest it is also included here.
Other (GGGI)			30,000,000	5,341,584	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	In 2013 and 2014 reporting (BR2 and MMR), support to GGGI is classified under multilateral climate funds, but in MMR 2015 (and 2016) GGGI is put under Multilateral financial institutions. We have put it here again. The support to GGGI is core support, but has here been put as climate-specific (as requested by MFA for MMR2016).
Other (Nordic Development Fund)	36,344,100	6,471,168			Disbursed	ODA	Grant			The DKK 36 mio. in core support to NDF are not included in the BR2 reporting, but since it is included in MMR 2015 and 2016, we suggest it is also included here.
Other (Other multilateral institutions)			26,217,328	4,668,068	Disbursed	ODA	Grant	Other (NA)	Other (NA)	The DKK 26 mio. to other multilateral institutions include DKK 10.5 mio. for Mekong River Commission, DKK 7.4 mio. for Intergovernmental Authority on Development, DKK 6 mio. to IEA, DKK 1.6 mio. to SADC, and DKK 0.7 mio. for OECD. This could be spread out individually, but it would require 6 additional lines to be included in the table.
Subtotal	**906,248,765**	**161,360,118**	**170,919,317**	**30,432,661**						
Specialized United Nations bodies										
1. United Nations Development Programme	335,912,616	59,810,177	12,250,000	2,181,147	Disbursed	ODA	Grant	Cross-Cutting	Other (82% Environmental policy and administrative management / 41010; 10% Multisector aid / 43010; 8% Civilian peace-building, conflict prevention and resolution / 15220)	
United Nations Development Programme			11,500,000	2,047,607	Disbursed	ODA	Grant	Adaptation	Democratic participation and civil society / 15150	
United Nations Development Programme			16,414,350	2,922,621	Disbursed	ODA	Grant	Mitigation	Other (64% Civilian peace-building, conflict prevention and resolution / 15220; 36% Environmental policy and administrative management / 41010)	
2. United Nations Environment Programme	25,000,000	4,451,320	18,950,000	3,374,100	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
United Nations Environment Programme			10,000,000	1,780,528	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	
3. Other										
Other (United Nations University)			500,000	89,026	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	
Other (UNIDO)	6,397,300	1,139,057			Disbursed	ODA	Grant			In BR2 UN "Other" include an undefined line of other support to UN institutions with core support of DKK 191 mio. This covers support in 2013 for WFP and UNIDO. We suggest that this support is specified on institutions
Other (ILO)			428,750	76,340	Disbursed	ODA	Grant	Adaptation	Human rights / 15160	
Other (WFP)	185,000,000	32,939,765			Disbursed	ODA	Grant			
Other (United Nations General Trust Fund)			4,000,000	712,211	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	We also suggest that climate specific support for a number of other UN institutions is included as multilateral climate-specific support. This was included as bilateral support (Table 7b) in BR2 and MMR 2015.
Other (United Nations Office for Project Services)			5,000,000	890,264	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
Subtotal	**552,309,916**	**98,340,319**	**79,043,100**	**14,073,844**						
Total	**1,558,558,681**	**277,505,716**	**309,852,032**	**55,170,018**						

Note : Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations : ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.616312) 5.6163

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2013.2.3 CTF-Table 7b-Disbursed-2013

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2013[a]

Recipient country/ region/project/programme/activity[b]	Total amount: Climate-specific[f, 2] Domestic currency	Total amount: Climate-specific[f, 2] USD	Status[c, 3] Committed / Disbursed	Funding source[4] ODA / OOF / Other[g]	Financial instrument[5] Grant / Concessional loan / Non-concessional loan / Equity / Other[g]	Type of support[6] Mitigation / Adaptation / Cross-cutting[h] / Other[g]	Sector[d, 7] Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[g]	Additional information[e]
Africa, regional	5,344,480	951,600	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2011001498ab / Support to Water Management in the SADC/Zambezi Region
Africa, regional	14,337,286	2,552,794	Disbursed	ODA	Grant	Cross-Cutting	Agricultural education/training / 31181	CRS 2011001526 / Africa Commission. University, Research, Agro-Business initiative URABI, (FARA)
Africa, regional	8,318,168	1,481,071	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	CRS 2012001010 / Voices for Change in Rural Africa
Asia, regional	8,729,125	1,554,245	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001201 / Climate Envelope 2012: IUCN - mangroves for the future (Asia)
Bangladesh	22,375,962	3,984,102	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	CRS 2010001680 / HYSAWA Fund Component
Bangladesh	1,506,685	268,269	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2010001681 / Sector Policy Support Component
Bangladesh	277,552	49,419	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2010001683 / Danida Adviser - Support to Water Supply and Sanitation Sector
Bangladesh	499,998	89,026	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2012001242 / Support to Government of bangladesh on Climate Chnage Negotiation
Bangladesh	4,946,164	880,678	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2013001119 / Climate Change Adaptation Pilot Project
Benin	3,000	534	Disbursed	ODA	Grant	Mitigation	Media and free flow of information / 15153	CRS 2008001467 / Consolidation de la Liberté de la Presse
Benin	78,283	13,938	Disbursed	ODA	Grant	Adaptation	Transport policy and administrative management / 21010	CRS 2011001527ab / Technical assistance to the Ministry of Transport and Roads Fund
Benin	1,041,718	185,481	Disbursed	ODA	Grant	Adaptation	Transport policy and administrative management / 21010	CRS 2011001527aa / Technical assistance to the Ministry of Transport and Roads Fund
Benin	1,357,892	241,776	Disbursed	ODA	Grant	Adaptation	Road transport / 21020	CRS 2011001528 / Techinal assistance to the communes
Benin	17,555,837	3,125,866	Disbursed	ODA	Grant	Adaptation	Road transport / 21020	CRS 2011001530 / Financial support for the Ministry of Transport and Roads Fund
Bhutan	5,749,569	1,023,727	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002295 / Budget Support for Capital Investments to Gewogs
Bhutan	10,452,242	1,861,051	Disbursed	ODA	Grant	Mitigation	Environmental education/ training / 41081	CRS 2009002297 / Capacity Development for Mainstreaming Environment, Climate Change and Poverty Concerns into Policies, Plans and Programmes
Bhutan	259,761	46,251	Disbursed	ODA	Grant	Adaptation	Multisector aid / 43010	CRS 2012001148 / Support to Gross National Happiness Centre
Bolivia	8,724,605	1,553,440	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001396ab / Support to policy development and national programmes of the agricultural sector
Bolivia	1,800,000	320,495	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001396aa / Support to policy development and national programmes of the agricultural sector
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mozambique	71,338	12,702	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2010001450 / Training of women as drivers of donated garbage trucks
Mozambique	3,750,000	667,698	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2010001458 / Component 3
Mozambique	819,775	145,963	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2010001460 / Administration/review
Mozambique	1,000,000	178,053	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2010001463 / Unallocated Funds
Mozambique	1,235,225	219,935	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2011001553 / B2B project: Kajovem & Jorton
Mozambique	1,100,000	195,858	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2011001559 / B2B Pilot Project: HelpMultiservice & Kuntkes Holding
Myanmar	750,000	133,540	Disbursed	ODA	Grant	Cross-Cutting	Media and free flow of information / 15153	CRS 2011001228 / (DVB) Support to Democratic Voice of Burma
Nepal	633,003	112,708	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2006001389 / ESAP II - Institutional support
Nepal	102,292	18,213	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	CRS 2010001277 / A Step Closer: Supporting development in the Karnali Zone
Nepal	11,123,772	1,980,619	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies /	CRS 2012001347 / NRREP: Central Renewable Energy Fund (CREF) Component
Nepal	15,597,500	2,777,178	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001360 / NRREP: Technical Support Component
Nepal	1,254,500	223,367	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001361 / NRREP: Productive Energy Component
Nepal	1,464,000	260,669	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001362 / NRREP: AEPC Administration
Nepal	260,882	46,451	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001363 / NRREP: Reviews, Audit and Studies
Niger	2,725,420	485,269	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	CRS 2008001522 / Institutional development on national level
Niger	1,779,207	316,793	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2008001523 / Institutional development on national level
Niger	13,735,208	2,445,592	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2008001528 / Rural development Support in Diffa and Zinder regions
Niger	173,262	30,850	Disbursed	ODA	Grant	Mitigation	Agricultural education/training / 31181	CRS 2008001530 / Danida Fellowship Centre
Niger	9,553,702	1,701,063	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001157 / Composante 1/Approvisionnement en Eau Potable et Gestion Intégrée de Ressources en Eau
Niger	2,388,552	425,280	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001158 / Composante 2/ Promotion de l'hygiène et de l'Assainissement de Base
Niger	524,987	93,475	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001160 / Conseiller Danida
North & Central America, regional	2,988	532	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2005001439 / Institutional Support to CCAD
North & Central America, regional	8,253	1,469	Disbursed	ODA	Grant	Mitigation	Rural development / 43040	CRS 2005001441 / Support to decentralized environmental management in Guatemala
North & Central America, regional	4,523	805	Disbursed	ODA	Grant	Mitigation	Rural development / 43040	CRS 2005001443 / Support to Eco enterprises in Guatemala
North & Central America, regional	9,405	1,675	Disbursed	ODA	Grant	Mitigation	Rural development / 43040	CRS 2005001444 / Eco-enterprises in sustainable management in Honduras
Serbia	1,696,058	301,988	Disbursed	ODA	Grant	Adaptation	Agricultural services / 31191	CRS 2010001509 / Private Sector Programme in Serbia, capacity building
Serbia	520,800	92,730	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	CRS 2010001510 / Private Sector Programme in Serbia, Financing facility
Serbia	365,899	65,149	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	CRS 2010001512 / Adviser
Somalia	2,000,000	356,106	Disbursed	ODA	Grant	Cross-Cutting	Livestock/veterinary services / 31195	CRS 2011001398aa / Danida Assistance to Somalia 2011-2014 Component 2: Growth and Employment
South Africa	1,512,573	269,318	Disbursed	ODA	Grant	Mitigation	Energy research / 23182	CRS 2008001542 / Support to capacity and knowledge development in wind ressource planning in South Africa
South Africa	60,121	10,705	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2009002009 / B2B Energi Danmark A/S and NETGroup South Africa (Pty) Ltd
South Africa	129,249	23,013	Disbursed	ODA	Grant	Cross-Cutting	Energy education/training / 23181	CRS 2012001269 / Project Support to Department of Energy for undertaking a public awareness campaign on wind energy
South Africa	8,522,014	1,517,368	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001288 / Climate Envelope 2012: South Africa - low carbon transition in the energy efficiency sector
South Africa	171,055	30,457	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001141 / Private/Public Partnership Project in the Water Sector
Tanzania	25,186	4,484	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001066 / Community Development and Sustainable Management of Marine Resources in Mnazi Bay and Ruvuma Estuary Marine Park (MBREMP) in Tanzania
Tanzania	35,682	6,353	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001286 / EMA-ISP Component 1
Tanzania	1,394,177	248,237	Disbursed	ODA	Grant	Mitigation	Forestry policy and administrative management / 31210	CRS 2007001291 / PFM - Component 3
Tanzania	601,646	107,125	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001491 / Support to Sustainable Access to Safe and Clean Water for Marginalized and Vulnerable Women and Girls in Monduli District
Uganda	780,307	138,936	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2008001259 / B2B Konserve Consult Ltd and Energimidt A/S
Uganda	6,809,458	1,212,443	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002062 / Development Assistance to Refugee Hosting Areas, Phase II
Uganda	18,591,745	3,310,312	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002325 / Agribusiness Development Initiative
Uganda	7,313,691	1,302,223	Disbursed	ODA	Grant	Cross-Cutting	Education and training in water supply and sanitation / 14081	CRS 2010001059 / Sector Budget Support to Rural Water Supply and Sanitation plus Water for Production
Uganda	507,690	90,396	Disbursed	ODA	Grant	Cross-Cutting	Culture and recreation / 16061	CRS 2010001581 / Youth Cultures Project
Uganda	309,417	55,093	Disbursed	ODA	Grant	Mitigation	Education and training in water supply and sanitation / 14081	CRS 2010001673ab / Joint Partnership Fund (basket)
Uganda	12,313,160	2,192,392	Disbursed	ODA	Grant	Mitigation	Education and training in water supply and sanitation / 14081	CRS 2010001673aa / Joint Partnership Fund (basket)
Uganda	335,863	59,801	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2010001676ab / Long term T.A
Uganda	355,561	63,309	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213	CRS 2011001556 / Firmenich and Uvan
Uganda	1,526,712	271,835	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	CRS 2012001411 / An integrated approach to natural resources management in Northern Uganda
Uganda	40,670,000	7,241,407	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2013001184 / Sector Budget Support for Rural Water Supply
Uganda	27,500,000	4,896,452	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001353 / Joint Partnership Fund-basket
Viet Nam	20,704,184	3,686,438	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2006001131 / Budget Support
Viet Nam	40,269	7,170	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	CRS 2006001132 / Technical assistance
Viet Nam	203,430	36,221	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	CRS 2006001133 / Programme management
Viet Nam	78,934	14,054	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	CRS 2007001119 / Central component
Viet Nam	10,594,051	1,886,300	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001365 / Support to National Target Programme on Climate Change
Viet Nam	15,337,459	2,730,877	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2008001366 / Support to National Energy Efficiency Programme
Viet Nam	1,068,739	190,292	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001367 / Programme management
Viet Nam	457,000	81,370	Disbursed	ODA	Grant	Mitigation	Agricultural co-operatives / 31194	CRS 2009002353 / Community Development among Ethnic Minorities in Nothern Vietnam
Viet Nam	944,489	168,169	Disbursed	ODA	Grant	Adaptation	Democratic participation and civil society / 15150	CRS 2010001271 / More Trees: Livelihood improvement and climate adaptation based on farm forestry in Northern Vietnam
Viet Nam	219,782	39,133	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2010001520 / Radio programme for Behaviour Change to Address Climate Change
Viet Nam	219,401	39,065	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2011001362 / Capacity buildign and completion of legal frameworks for Vietnam marine protected areas network
Viet Nam	261,902	46,632	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2011001479ab / Renewable Energy Water Supply for the Mekong Delta
Viet Nam	397,074	70,700	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001287ab / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	1,860,159	331,207	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001287aa / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	449,612	80,055	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2012001486 / Danish support to Reduction of Non-Revenue Water in Vietnam
Zambia	4,579,588	815,408	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001475 / Capacity development
Zambia	2,166,117	385,686	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001478 / Civil Society Fund
Zambia	11,253	2,004	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001481 / Program reviews
Zambia	344,620	61,361	Disbursed	ODA	Grant	Mitigation	Environmental education/ training / 41081	CRS 2009002249 / Climate Change Programme Zambia
Zambia	752,281	133,946	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2011001393 / Review, Audit and Studies
Zambia	4,671,754	831,819	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2011001407ab / Peri-Urban Water Supply and Sanitation
Zambia	662,118	117,892	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2011001407aa / Peri-Urban Water Supply and Sanitation
Zambia	5,368,789	955,928	Disbursed	ODA	Grant	Cross-Cutting	Water resources conservation (including data collection) / 14015	CRS 2011001445 / Capacity Building University of Zambia (UNZA)

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.616312) 5.6163

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2014 CTF Table 7-, 7a- and 7b-formats

2014.1 Committed

2014.1.1 CTF-Table 7-Committed-2014

Allocation channels	2014									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2] Mitigation	Adaptation	Cross-cutting[e]	Other[f]	Core/ general[c]	Climate-specific[d, 2] Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,491,764,000	53,293,500	0	352,050,000	0	265,794,703	9,495,557	0	62,726,427	0
Multilateral climate change funds	435,000,000	0	0	150,000,000	0	77,506,024	0	0	26,726,215	0
Other multilateral climate change funds	0	0	0	0	0	0	0	0	0	0
Multilateral financial institutions, including regional development banks	491,448,000	11,543,500	0	161,050,000	0	87,563,633	2,056,760	0	28,695,046	0
Specialized United Nations bodies	565,316,000	41,750,000	0	41,000,000	0	100,725,047	7,438,797	0	7,305,165	0
Total contributions through bilateral, regional and other channels		417,418,500	0	905,262,500	0		74,373,444	0	161,294,935	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		470,712,000	0	1,257,312,500	0		83,869,001	0	224,021,362	0
Total climate specific finance		1,728,024,500					307,890,363			

Note : Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation : USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 5.612467) 5.6125

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2014.1.2 CTF-Table 7a-Committed-2014

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2014[a]

Donor funding	Total amount				Status[b, 3]	Funding source[4]	Financial instrument[5]	Type of support[6]	Sector[c, 7]
	Core/general[d, 1]		Climate-specific[e, 2]		Committed Disbursed	ODA OOF Other[f]	Grant Concessional loan Non-concessional loan Equity Other[f]	Mitigation Adaptation Cross-cutting[g] Other[f]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other[f] Not applicable
	Domestic currency	USD	Domestic currency	USD					
Multilateral climate change funds									
1. Global Environment Facility	435,000,000	77,506,024			Committed	ODA	Grant		
2. Least Developed Countries Fund									
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund			150,000,000	26,726,215	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other									
Subtotal	**435,000,000**	**77,506,024**	**150,000,000**	**26,726,215**					
Multilateral financial institutions, including regional development banks									
1. World Bank									
World Bank (IDA)	411,320,000	73,286,845			Committed	ODA	Grant		
World Bank (IBRD)			57,000,000	10,155,962	Committed	ODA	Grant	Cross-cutting	Other (99% Agricultural development / 31120, 1% Anti-corruption organisations and institutions / 15113)
World Bank (IBRD)			3,000,000	534,524	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110
2. International Finance Corporation	25,000,000	4,454,369	14,050,000	2,503,355	Committed	ODA	Grant	Cross-cutting	Environmental policy and administrative management / 41010
3. African Development Bank									
African Development Bank (AFDF)	55,128,000	9,822,419			Committed	ODA	Grant		
4. Asian Development Bank									
5. European Bank for Reconstruction and Development			4,750,000	846,330	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210
6. Inter-American Development Bank			2,941,000	524,012	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
7. Other (OECD)			852,500	151,894	Committed	ODA	Grant	Mitigation	Research/scientific institutions / 43082
Other (GGGI)			90,000,000	16,035,729	Committed	ODA	Grant	Cross-cutting	Environmental policy and administrative management / 41010
Subtotal	**491,448,000**	**87,563,633**	**172,593,500**	**30,751,807**					
Specialized United Nations bodies									
1. United Nations Development Programme	345,000,000	61,470,295	36,750,000	6,547,923	Committed	ODA	Grant	Mitigation	Other (80% Energy policy and administrative management / 23110, 20% Environmental policy and administrative management / 41010)
2. United Nations Environment Programme			40,000,000	7,126,991	Committed	ODA	Grant	Cross-cutting	Environmental policy and administrative management / 41010
United Nations Environment Programme			5,000,000	890,874	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
3. Other									
Other (UN Global Compact)			1,000,000	178,175	Committed	ODA	Grant	Cross-cutting	Small and medium-sized enterprises (SME) development / 32130
Other (UNIDO)	5,316,000	947,177			Committed	ODA	Grant		
Other (United Nations International Strategy for Disaster Reduction)	5,000,000	890,874			Committed	ODA	Grant		
Other (WFP)	210,000,000	37,416,701			Committed	ODA	Grant		
Subtotal	**565,316,000**	**100,725,047**	**82,750,000**	**14,743,962**					
Total	**1,491,764,000**	**265,794,703**	**405,343,500**	**72,221,984**					

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.612467) 5.6125

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2014.1.3 CTF-Table 7b-Committed-2014

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2014[a]

Recipient country/ region/project/programme/activity[b]	Total amount – Climate-specific[f, 2] – Domestic currency	Total amount – Climate-specific[f, 2] – USD	Status[c, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[g])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[g])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[h] / Other[g])	Sector[d, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[g])	Additional information[e]
Afghanistan	35,000,000	6,236,117	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001300ab / Afghanistan Country Programme - TP 3: Growth and Employment
Afghanistan	95,000,000	16,926,603	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001300aa / Afghanistan Country Programme - TP 3: Growth and Employment
Africa, regional	725,000	129,177	Committed	ODA	Grant	Cross-Cutting	Public sector policy and administrative management / 15110	CRS 2014001040 / Opfølgning på Opportunity Africa 2014
Asia, regional	600,000	106,905	Committed	ODA	Grant	Cross-Cutting	Human rights / 15160	CRS 2014001107 / Support to ASEAN workshop on Human Rights, Environment and Climate Change
Asia, regional	3,000,000	534,524	Committed	ODA	Grant	Cross-Cutting	Security system management and reform / 15210	CRS 2014001161 / JCLEC - core support to JCLEC strategic plan 2014-2019
Bangladesh	33,770,000	6,016,962	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221ab / Climate Change Adaptation and Mitigation Programme
Bangladesh	6,980,000	1,243,660	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221ad / Climate Change Adaptation and Mitigation Programme
Bangladesh	700,000	124,722	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221aa / Climate Change Adaptation and Mitigation Programme
Bolivia	1,800,000	320,715	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001396ab / Support to policy development and national programmes of the agricultural sector
Bolivia	5,900,000	1,051,231	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001396aa / Support to policy development and national programmes of the agricultural sector
Bolivia	450,000	80,179	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001398ab / Support to small and medium sized enterprises and rural economic organisations in the agricultural production sector
Bolivia	4,000,000	712,699	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2013001339ac / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	12,460,000	2,220,058	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001340ab / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	112,000,000	19,955,574	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2013001378ab / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	2,500,000	445,437	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2013001378ac / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	10,500,000	1,870,835	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2013001378aa / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	1,500,000	267,262	Committed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	CRS 2014001175 / Research and Outreach activities on Equitable and Sustainable Development, 2014-2017- Core Funding for Fundación INESAD
China (People's Republic of)	3,676,000	654,970	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2008001543 / Renewable Energy Programme: Component 1 - institutional development
China (People's Republic of)	1,550,000	276,171	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2008001545 / Renewable Energy Programme: Programme Administration
China (People's Republic of)	300,000	53,452	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2008001546 / Renewable Energy Programme: International Programme Advisor
China (People's Republic of)	620,000	110,468	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2008001547 / Renewable Energy Programme: Monitoring and Reviews
Developing countries, unspecified	929,500	165,613	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001001 / Preparation and information of evaluations, evaluation studies and other studies
Developing countries, unspecified	60,500,000	10,779,573	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001005 / Rammeaftale med Ibis
Developing countries, unspecified	61,500,000	10,957,748	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001008 / Rammeaftale med Folkekirkens Nødhjælp
Developing countries, unspecified	28,000,000	4,988,893	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001010 / Rammeaftale med Red Barnet
Developing countries, unspecified	7,500,000	1,336,311	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001014 / Frame Agreement with Verdens Skove
Developing countries, unspecified	5,000,000	890,874	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001041 / 3GF 2014-bevilling
Developing countries, unspecified	6,000,000	1,069,049	Committed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	CRS 2014001079 / International Research
Developing countries, unspecified	7,000,000	1,247,223	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001082 / Frame agreement with Danmission 2014
Developing countries, unspecified	14,500,000	2,583,534	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001083 / Frame agreement with Caritas 2014
Developing countries, unspecified	5,000,000	890,874	Committed	ODA	Grant	Mitigation	Sectors not specified / 99810	CRS 2014001084 / Frame agreement with Vedvarende Energi 2014
Developing countries, unspecified	1,274,000	226,995	Committed	ODA	Grant	Cross-Cutting	Relief co-ordination; protection and support services / 72050	CRS 2014001096 / Evaluation of the Danish Humantarian Strategy 2010-2015
Developing countries, unspecified	4,350,000	775,060	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001106 / Evaluation of the Danish Climate Change Funding to Developing Countries
Developing countries, unspecified	2,500,000	445,437	Committed	ODA	Grant	Cross-Cutting	Human rights / 15160	CRS 2014001128 / General Support to Transparency International
Developing countries, unspecified	4,577,500	815,595	Committed	ODA	Grant	Cross-Cutting	Multisector education/training / 43081	CRS 2014001145 / Grant for the administration af research to Danida Fellowship centre
Developing countries, unspecified	45,000,000	8,017,865	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001167 / Support for climate and energy actitities in developing countries UNEP and UNEP-Risø
Developing countries, unspecified	24,362,500	4,340,783	Committed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	CRS 2014001184 / Research projects/FFU incl. pilot projects from 2008. South and North driven from 2013
Developing countries, unspecified	43,729,500	7,791,493	Committed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	CRS 2014001185 / Research projects/FFU incl. pilot projects from 2008. South and North driven from 2013
Developing countries, unspecified	22,760,000	4,055,258	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2014001186 / Low Carbon Transition Unit (LCTU)
Developing countries, unspecified	25,000,000	4,454,369	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2014001229 / Global Climate Partnership Fund (GCPF)
Developing countries, unspecified	1,250,000	222,718	Committed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	CRS 2014001233 / Joint Scandinavian evaluation of support to capacity development
Developing countries, unspecified	15,000,000	2,672,622	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001234 / IIED 2014-2019
Developing countries, unspecified	1,350,000	240,536	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2014001292 / Klimapuljen 2014 - Support to negotiation activitites
Developing countries, unspecified	37,500,000	6,681,554	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001332 / Rio+20 - CISU - Civil Society Activities in the area of Climate and Environment, contribution 2014-2016
Developing countries, unspecified	25,000,000	4,454,369	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001371 / IUCN - Programme support 2015-2016
Developing countries, unspecified	73,800,000	13,149,298	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2014001384 / Nationally Appropriate Mitigation Actions (NAMA) Facility
Developing countries, unspecified	751,000	133,809	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2014200036 / General contribution to IUCN
Egypt	2,003,000	356,884	Committed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213(	CRS 2014001172 / Mathiesen Plast and Jana - Sauce Production
Ghana	948,000	168,910	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2014121585 / Small-scale activities aggregated
Ghana	469,000	83,564	Committed	ODA	Grant	Mitigation	Biofuel-fired power plants / 23270	CRS 2014128231 / Small-scale activities aggregated
Indonesia	2,125,000	378,621	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2014001199 / DBP Kaltimex Lestari Makmur and Syntes Engineering
Kenya	7,500,000	1,336,311	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002460aa / Component 1. Environmental Policies and Governance
Kenya	1,000,000	178,175	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002472ab / Component 2. Support to Arid Lands Resource Management
Kenya	2,200,000	391,984	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001108 / Climate Innovation Centre Kenya - 3GF
Kenya	1,247,000	222,184	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2014001385 / Real-Time Evaluationof the Danida Country Programme for Kenya
Mali	1,580,500	281,605	Committed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	CRS 2009002330ac / Appui au BPO Eau
Mali	60,626,500	10,802,113	Committed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	CRS 2009002330ad / Appui au BPO Eau
Mali	34,570,000	6,159,502	Committed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	CRS 2009002330aa / Appui au BPO Eau
Mozambique	15,000,000	2,672,622	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001325 / Climate Change and Environmental Sector Programme Support Phase III
Mozambique	25,000,000	4,454,369	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001326 / Climate Change and Environmental Sector Programme Support Phase III
Nepal	1,900,000	338,532	Committed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213(	CRS 2014001100 / Mirage Printing Solution P. Ltd and Nilpeter A/S
Niger	41,000,000	7,305,165	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001138aa / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Tanzania	14,000,000	2,494,447	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001287aa / UDEM - Component 2
Tanzania	200,000	35,635	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001288 / Adviser
Tanzania	62,500	11,136	Committed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001491 / Support to Sustainable Access to Safe and Clean Water for Marginalized and Vulnerable Women and Girls in Monduli District
Tanzania	2,500,000	445,437	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2013001365 / BSPS IV - Component 1: Agricultural Markets Development
Uganda	5,593,000	996,531	Committed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002325 / Agribusiness Development Initiative
Uganda	375,000	66,816	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001355ab / Administration/review
Uganda	130,000,000	23,162,720	Committed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2014001147 / Agribusiness Initiative - aBi Trust & aBi Finance
Uganda	5,746,500	1,023,881	Committed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149ab / Recovery and Development in Northern Uganda
Uganda	64,253,500	11,448,352	Committed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149aa / Recovery and Development in Northern Uganda
Uganda	22,500,000	4,008,932	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001150 / Unallocated Funds
Uganda	5,000,000	890,874	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001151 / Reviews and Studies
Ukraine	7,500,000	1,336,311	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2014001401ab / Renewable Energy and Energy Efficiency Programme 2014-17.
Ukraine	7,750,000	1,380,854	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2014001401aa / Renewable Energy and Energy Efficiency Programme 2014-17.
Viet Nam	617,000	109,934	Committed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2006001132ab / Technical assistance
Viet Nam	300,000	53,452	Committed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	CRS 2007001119 / Central component
Viet Nam	1,949,500	347,352	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2014001245 / DBP Thuy Son JSC and C.F. Nielsen A/S
	1,322,681,000							

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.612467) 5.6125

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2014.2 Disbursed

2014.2.1 CTF-Table 7-Disbursed-2014

Allocation channels	2014									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,360,481,000	98,244,500	55,000,000	182,006,000	33,401,000	242,403,385	17,504,691	9,799,612	32,428,877	5,951,215
Multilateral climate change funds	135,000,000	0	0	100,000,000	0	24,053,594	0	0	17,817,477	0
Other multilateral climate change funds	0	0	0	0	6,722,000	0	0	0	0	1,197,691
Multilateral financial institutions, including regional development banks	600,687,000	72,363,500	40,000,000	40,786,500	26,679,000	107,027,266	12,893,350	7,126,991	7,267,125	4,753,525
Specialized United Nations bodies	624,794,000	25,881,000	15,000,000	41,219,500	0	111,322,525	4,611,341	2,672,622	7,344,275	0
Total contributions through bilateral, regional and other channels		393,386,500	115,893,500	605,763,000	0		70,091,548	20,649,297	107,931,681	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		491,631,000	170,893,500	787,769,000	33,401,000		87,596,239	30,448,910	140,360,558	5,951,215
Total climate specific finance		1,483,694,500					264,356,922			

Note : Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).
Abbreviation : USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.
[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.
[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.
[d] Parties should explain in their biennial reports how they define funds as being climate-specific.
[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.
[f] Please specify.
[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.
[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 5.612467) 5.6125
Source: OECD
https://data.oecd.org/conversion/exchange-rates.htm

2014.2.2 CTF-Table 7a-Disbursed-2014

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2014[a]

Donor funding	Total amount: Core/general[d, 1]: Domestic currency	Total amount: Core/general[d, 1]: USD	Total amount: Climate-specific[e, 2]: Domestic currency	Total amount: Climate-specific[e, 2]: USD	Status[b, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[f])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[f])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[g] / Other[f])	Sector[c, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[f] / Not applicable)	Notes for MFA
Multilateral climate change funds										
1. Global Environment Facility	135,000,000	24,053,594			Disbursed	ODA	Grant			
2. Least Developed Countries Fund										
3. Special Climate Change Fund										
4. Adaptation Fund										
5. Green Climate Fund			100,000,000	17,817,477	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	All core support from multilateral climate funds is counted as climate-specific, except for support to GEF. The DKK 100 mio. in core funding to GCF in 2014 has been moved accordingly. This is different from BR2, where it is counted as core funding.
6. UNFCCC Trust Fund for Supplementary Activities										
UNFCCC Trust Fund for Supplementary Activities										
7. Other (Multilateral Fund for the Implementation of the Montreal Protocol)			6,722,000	1,197,691	Disbursed	ODA	Grant	Other (NA)	Environmental policy and administrative management / 41010	All core support from multilateral climate funds is counted as climate-specific, except for support to GEF. The DKK 6.7 mio. in core funding to Montreal Protocol has been moved accordingly. This support did not figure in BR2, but support to Montreal Protocol is included in DK's MMR reporting in 2015 and 2016, and has therefore been included here.
Subtotal	**135,000,000**	**24,053,594**	**106,722,000**	**19,015,167**						
Multilateral financial institutions, including regional development banks										
1. World Bank										
World Bank (IDA)	411,320,000	73,286,845			Disbursed	ODA	Grant			DKK 81 mio. in core support to IDA Multilateral Debt Relief Initiative is not included in the core support to the World Bank in BR2. We suggest they are also not included here. The DKK 3.6 mio. marked as core funding for IBRD is in BR2 counted as climate specific. The classification as core funding (actually for preparing the GCF) seems to be correct, even though the funding was provided under the Climate Envelope.
World Bank (IBRD)	3,600,000	641,429	5,500,000	979,961	Disbursed	ODA	Grant	Cross-Cutting	Other (91% Agricultural development / 31120; 9% Anti-corruption organisations and institutions / 15113)	
World Bank (IBRD)			40,000,000	7,126,991	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	
World Bank (IBRD)			43,445,000	7,740,803	Disbursed	ODA	Grant	Mitigation	Other (79% Environmental policy and administrative management / 41010; 21% Energy policy and administrative management / 23110)	
2. International Finance Corporation	26,000,000	4,632,544	7,275,000	1,296,221	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Core support to IFC is in BR2 added to the overall WB support, but since it is seperated in the table from UNFCCC we have also seperated it here.
3. African Development Bank			93,000	16,570	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	
African Development Bank (AFDF)	55,101,000	9,817,608			Disbursed	ODA	Grant			
4. Asian Development Bank			24,075,500	4,289,647	Disbursed	ODA	Grant	Mitigation	Energy manufacturing / 32167	
Asian Development Bank (AsDF)	33,308,000	5,934,645			Disbursed	ODA	Grant			
5. European Bank for Reconstruction and Development			4,750,000	846,330	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	
6. Inter-American Development Bank										
7. Other (CGIAR)	35,000,000	6,236,117			Disbursed	ODA	Grant			The DKK 36 mio. in core support to CGIAR are not included in the BR2 reporting, but since it is included in MMR 2015 and 2016, we suggest it is also included here. In 2013 and 2014 reporting (BR2 and MMR), support to GGGI is classified under multilateral climate funds, but in MMR 2015 (and 2016) GGGI is put under Multilateral financial institutions. We have put it here again. The support to GGGI is core support, but has here been put as climate-specific (as requested by MFA for MMR2016).
Other (GGGI)			28,011,500	4,990,942	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
Other (Nordic Development Fund)	36,358,000	6,478,078			Disbursed	ODA	Grant			The DKK 36 mio. in core support to NDF are not included in the BR2 reporting, but since it is included in MMR 2015 and 2016, we suggest it is also included here. The DKK 26 mio. to other multilateral institutions include DKK 6 mio. for Mekong River Commission, DKK 10.8 mio. for Intergovernmental Authority on Development, DKK 0.1 mio. to SADC, and DKK 9.7 mio. for OECD. This could be spread out individually, but it would require 5 additional lines to be included in the table.
Other (Other multilateral institutions)			26,679,000	4,753,525	Disbursed	ODA	Grant	Other (NA)	Other (NA)	
Subtotal	**600,687,000**	**107,027,266**	**179,829,000**	**32,040,990**						
Specialized United Nations bodies										
1. United Nations Development Programme	346,478,000	61,733,637	20,881,000	3,720,467	Disbursed	ODA	Grant	Mitigation	Other (50% Civilian peace-building, conflict prevention and resolution / 15220; 32% Energy policy and administrative management / 23110; 18% Environmental policy and administrative management / 41010)	
2. United Nations Environment Programme	30,000,000	5,345,243	35,000,000	6,236,117	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
United Nations Environment Programme			5,000,000	890,874	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	
3. Other (UN)										
Other (FAO)			15,000,000	2,672,622	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	In BR2 UN "Other" include an undefined line of other support to UN institutions with core support of DKK 248 mio. This covers support in 2014 for WFP, ISDR, IFAD and UNIDO. We suggest that this support is specified on institutions We also suggest that climate-specific support for a number of other UN institutions is included as multilateral climate-specific support. This was included as bilateral support (Table 7b) in BR2 and MMR 2015.
Other (IFAD)	28,000,000	4,988,893			Disbursed	ODA	Grant			
Other (UNIDO)	5,316,000	947,177			Disbursed	ODA	Grant			
Other (ISDR)	5,000,000	890,874			Disbursed	ODA	Grant			
Other (Economic Commission for Europe)			219,500	39,109	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	
Other (Office for Project Services)			5,000,000	890,874	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
Other (WFP)	210,000,000	37,416,701			Disbursed	ODA	Grant			
Other (United Nations Global Compact)			1,000,000	178,175	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	
Subtotal	**624,794,000**	**111,322,525**	**82,100,500**	**14,628,237**						
Total	**1,360,481,000**	**242,403,385**	**368,651,500**	**65,684,395**						

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.612467) 5.6125

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2014.2.3 CTF-Table 7b-Disbursed-2014

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2014[a]

Recipient country/ region/project/programme/activity[b]	Total amount: Climate-specific[f, 2]: Domestic currency	Total amount: Climate-specific[f, 2]: USD	Status[a, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[g])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[g])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[h] / Other[g])	Sector[d, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[g])	Additional information[e]
Afghanistan	9,750,000	1,737,204	Disbursed	ODA	Grant	Mitigation	Rural development / 43040	CRS 2013001246 / Support to National Solidarity Programme (NSP)
Afghanistan	9,000,000	1,603,573	Disbursed	ODA	Grant	Cross-Cutting	Material relief assistance and services / 72010	CRS 2013001248 / Support to DACAAR
Afghanistan	16,500,000	2,939,884	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001300ab / Afghanistan Country Programme - TP 3: Growth and Employment
Afghanistan	25,000,000	4,454,369	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001300aa / Afghanistan Country Programme - TP 3: Growth and Employment
Africa, regional	234,000	41,693	Disbursed	ODA	Grant	Mitigation	Agricultural education/training / 31181	CRS 2009002287 / Africa Commission. University, Research, Agro-Business initiative URABI, (FARA)
Africa, regional	4,709,000	839,025	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2011001498aa / Support to Water Management in the SADC/Zambezi Region
Africa, regional	15,681,500	2,794,048	Disbursed	ODA	Grant	Cross-Cutting	Agricultural education/training / 31181	CRS 2011001526 / Africa Commission. University, Research, Agro-Business initiative URABI, (FARA)
Africa, regional	68,000	12,116	Disbursed	ODA	Grant	Cross-Cutting	Public sector policy and administrative management / 15110	CRS 2014001040 / Opfølgning på Opportunity Africa 2014
Asia, regional	14,885,000	2,652,131	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001201 / Climate Envelope 2012: IUCN - mangroves for the future (Asia)
Asia, regional	584,500	104,143	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	CRS 2013001225 / CSR-facility: Fashion Links - Access to Sustainable Production
Asia, regional	564,500	100,580	Disbursed	ODA	Grant	Cross-Cutting	Human rights / 15160	CRS 2014001107 / Support to ASEAN workshop on Human Rights, Environment and Climate Change
Asia, regional	1,250,000	222,718	Disbursed	ODA	Grant	Cross-Cutting	Security system management and reform / 15210	CRS 2014001161 / JCLEC - core support to JCLEC strategic plan 2014-2019
Bangladesh	38,788,500	6,911,132	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	CRS 2010001680 / HYSAWA Fund Component
Bangladesh	1,411,000	251,405	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2010001681 / Sector Policy Support Component
Bangladesh	135,000	24,054	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2010001682 / Programme Management and Review
Bangladesh	4,966,000	884,816	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2013001119 / Climate Change Adaptation Pilot Project
Bangladesh	10,814,000	1,926,782	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221ab / Climate Change Adaptation and Mitigation Programme
Bangladesh	4,000	713	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221aa / Climate Change Adaptation and Mitigation Programme
Benin	263,000	46,860	Disbursed	ODA	Grant	Adaptation	Transport policy and administrative management / 21010	CRS 2011001527 / Technical assistance to the Ministry of Transport and Roads Fund
Benin	255,000	45,435	Disbursed	ODA	Grant	Adaptation	Road transport / 21020	CRS 2011001528 / Techinal assistance to the communes
Bolivia	12,000	2,138	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2005001125 / Support to Local Economic Development within the Agricultural Sector of Potosi and Chuquisaca
Bolivia	2,695,500	480,270	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001396aa / Support to policy development and national programmes of the agricultural sector
Bolivia	1,088,000	193,854	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001398ac / Support to small and medium sized enterprises and rural economic organisations in the agricultural production sector
Bolivia	453,000	80,713	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001402 / Administration, consultancies and management
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nepal	4,000,000	712,699	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies /	CRS 2012001360 / NRREP: Technical Support Component
Nepal	1,000,000	178,175	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001361 / NRREP: Productive Energy Component
Nepal	1,000,000	178,175	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001362 / NRREP: AEPC Administration
Nepal	99,000	17,639	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	CRS 2012001363 / NRREP: Reviews, Audit and Studies
Nepal	294,000	52,383	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213	CRS 2013001129 / DBP Nepal Fertiliser Industries and Biosa ApS
Nepal	232,500	41,426	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213	CRS 2014001100 / Mirage Printing Solution P. Ltd and Nilpeter A/S
Niger	489,000	87,127	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	CRS 2008001522 / Institutional development on national level
Niger	22,000	3,920	Disbursed	ODA	Grant	Mitigation	Agricultural education/training / 31181	CRS 2008001530 / Danida Fellowship Centre
Niger	10,211,000	1,819,343	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001157 / Composante 1/Approvisionnement en Eau Potable et Gestion Intégrée de Ressources en Eau
Niger	4,478,000	797,867	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001158 / Composante 2/ Promotion de l'Hygiène et de l'Assainissement de Base
Niger	591,500	105,390	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001160 / Conseiller Danida
Niger	1,186,500	211,404	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001171 / Assistance technique par Bureaux d'études
Niger	163,000	29,042	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001172 / Revues, Audits, études et formulation de la 3ème phase du programme
Niger	2,250,000	400,893	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001138aa / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
North & Central America, regional	1,500	267	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2005001439 / Institutional Support to CCAD
Serbia	1,974,500	351,806	Disbursed	ODA	Grant	Adaptation	Agricultural services / 31191	CRS 2010001509 / Private Sector Programme in Serbia, capacity building
Serbia	2,604,500	464,056	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	CRS 2010001510 / Private Sector Programme in Serbia, Financing facility
Serbia	79,000	14,076	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	CRS 2010001511 / Administration incl. audit and review
Serbia	372,000	66,281	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	CRS 2010001512 / Adviser
Somalia	2,000,000	356,350	Disbursed	ODA	Grant	Cross-Cutting	Livestock/veterinary services / 31195	CRS 2011001398 / Danida Assistance to Somalia 2011-2014 Component 2: Growth and Employment
Somalia	5,000,000	890,874	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2012001418aa / Horn of Africa - comp. 2: FAO and NGO consortium: support to resilience in Somalia
South Africa	97,500	17,372	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2005001231 / Component 1 Support to National and provincial spheres
South Africa	108,000	19,243	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2005001232 / Component 2 Civil society, knowledge management and research
South Africa	888,000	158,219	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2005001233 / Component 3 Local government support for urban environmental management
South Africa	2,166,000	385,927	Disbursed	ODA	Grant	Mitigation	Energy research / 23182	CRS 2008001642 / Support to capacity and knowledge development in wind ressource planning in South Africa
South Africa	1,283,000	228,598	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001288 / Climate Envelope 2012: South Africa - low carbon transition in the energy efficiency sector
South Africa	370,500	66,014	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001141 / Private/Public Partnership Project in the Water Sector
South of Sahara, regional	1,285,000	228,955	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	CRS 2013001212 / CSR-Facility: Establishment and implementation of international standards for sustainable and traceable cocoa
South of Sahara, regional	1,048,000	186,727	Disbursed	ODA	Grant	Mitigation	Trade facilitation / 33120	CRS 2013001326 / Organic Denmark - project identification for the project ECOMEA 'Enhancing the capacity of the organic movements in East Africa'
Tanzania	32,000	5,702	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001286 / EMA-ISP Component 1
Tanzania	290,000	51,671	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001287ab / UDEM - Component 2
Tanzania	9,792,500	1,744,776	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001287aa / UDEM - Component 2
Tanzania	224,000	39,911	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2007001288 / Adviser
Tanzania	188,500	33,586	Disbursed	ODA	Grant	Mitigation	Forestry policy and administrative management / 31210	CRS 2007001291 / PFM - Component 3
Tanzania	635,000	113,141	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001491 / Support to Sustainable Access to Safe and Clean Water for Marginalized and Vulnerable Women and Girls in Monduli District
Tanzania	589,500	105,034	Disbursed	ODA	Grant	Mitigation	Water transport / 21040	CRS 2013001193 / Renewal of Ferry Fleet on Lake Victoria, Lake Tanganyika and Lake Nyasa: Support to Detailed Design and Tendering
Tanzania	1,242,000	221,293	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2013001365 / BSPS IV - Component 1: Agricultural Markets Development
Uganda	163,000	29,042	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2008001269 / B2B Konsene Consult Ltd and Energimidt A/S
Uganda	1,753,500	312,429	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002060 / Restoration of Agricultural Livelihood in Northern Uganda
Uganda	96,000	17,105	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002062 / Development Assistance to Refugee Hosting Areas, Phase II
Uganda	6,336,500	1,129,004	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2009002325 / Agribusiness Development Initiative
Uganda	211,500	37,684	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	CRS 2010001260 / Eco- Community School programme in Uganda
Uganda	97,500	17,372	Disbursed	ODA	Grant	Cross-Cutting	Culture and recreation / 16061	CRS 2010001581 / Youth Cultures Project
Uganda	647,000	115,279	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213	CRS 2011001556 / Firmenich and Uvan
Uganda	577,000	102,807	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213	CRS 2012001213 / International Woodland Company and Continental Forests Ltd.
Uganda	1,728,000	307,886	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	CRS 2012001411 / An integrated approach to natural resources management in Northern Uganda
Uganda	58,100,000	10,351,954	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2013001184 / Sector Budget Support for Rural Water Supply
Uganda	27,500,000	4,899,806	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001353 / Joint Partnership Fund-basket
Uganda	1,086,000	193,498	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001354 / Long term technical assistance
Uganda	225,000	40,089	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001355ab / Administration/review
Uganda	799,000	142,362	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001355aa / Administration/review
Uganda	22,251,500	3,964,656	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	CRS 2014001147 / Agribusiness Initiative - aBi Trust & aBi Finance
Uganda	26,500	4,722	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149ab / Recovery and Development in Northern Uganda
Uganda	328,500	58,530	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149aa / Recovery and Development in Northern Uganda
Viet Nam	5,347,000	952,700	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2006001131 / Budget Support
Viet Nam	1,029,000	183,342	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2006001132aa / Technical assistance
Viet Nam	120,500	21,470	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2006001133 / Programme management
Viet Nam	155,500	27,706	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	CRS 2007001119 / Central component
Viet Nam	43,645,000	7,776,438	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001365 / Support to National Target Programme on Climate Change
Viet Nam	15,991,000	2,849,193	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2008001366 / Support to National Energy Efficiency Programme
Viet Nam	650,000	115,814	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001367 / Programme management
Viet Nam	8,000	1,425	Disbursed	ODA	Grant	Mitigation	Urban development and management / 43030	CRS 2009002068 / Local Agenda 21 Activities in Poor in Low-income Communities in Hanoi
Viet Nam	246,500	43,920	Disbursed	ODA	Grant	Mitigation	Agricultural co-operatives / 31194	CRS 2009002353 / Community Development among Ethnic Minorities in Northern Vietnam
Viet Nam	1,590,000	283,298	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2011001479 / Renewable Energy Water Supply for the Mekong Delta
Viet Nam	39,233,000	[illegible]	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001287ab / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	1,182,000	210,603	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001287aa / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	227,500	40,535	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2013001147 / Danish Active House in Vietnam
Viet Nam	500,500	89,176	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213	CRS 2013001197 / DBP: ABBO ltd. and Vestas Wind System A/S
Viet Nam	617,000	109,934	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 3213	CRS 2013001198 / DBP: University of Can Tho and Oxy Guard International A/S
Zambia	11,500	2,049	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2008001475 / Capacity development
Zambia	1,673,000	298,086	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2011001391 / Rural Water Supply and Sanitation
Zambia	234,500	41,782	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2011001393 / Review, Audit and Studies
Zambia	155,500	27,706	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	CRS 2011001407 / Peri-Urban Water Supply and Sanitation
Zambia	94,000	16,748	Disbursed	ODA	Grant	Cross-Cutting	Water resources conservation (including data collection) / 14015	CRS 2011001445 / Capacity Building University of Zambia (UNZA)

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 5.612467) 5.6125

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2015 CTF Table 7-, 7a- and 7b-formats

2015.1 COMMITTED

2015.1.1 CTF-Table 7-Committed-2015

Allocation channels	2015									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,396,569,370	37,976,000	2,400,000	251,250,000	0	207,578,578	5,644,549	356,723	37,344,452	0
Multilateral climate change funds	0	0	0	250,000,000	0	0	0	0	37,158,659	0
Other multilateral climate change funds	0	0	0	0	0	0	0	0	0	0
Multilateral financial institutions, including regional development banks	835,669,370	37,976,000	2,400,000	0	0	124,209,412	5,644,549	356,723	0	0
Specialized United Nations bodies	560,900,000	0	0	1,250,000	0	83,369,167	0	0	185,793	0
Total contributions through bilateral, regional and other channels		154,050,535	86,501,090	541,970,370	0		22,897,245	12,857,058	80,555,568	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		192,026,535	88,901,090	793,220,370	0		28,541,794	13,213,781	117,900,020	0
Total climate specific finance		1,074,147,995					159,655,595			

Note : Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation : USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 6.727907) 6.7279

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2015.1.2 CTF-Table 7a-Committed-2015

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2015[a]

Donor funding	Total amount				Status[b, 3]	Funding source[4]	Financial instrument[5]	Type of support[6]	Sector[c, 7]
	Core/general[d, 1]		Climate-specific[e, 2]		Committed Disbursed	ODA OOF Other[f]	Grant Concessional loan Non-concessional loan Equity Other[f]	Mitigation Adaptation Cross-cutting[g] Other[f]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other[f] Not applicable
	Domestic currency	USD	Domestic currency	USD					
Multilateral climate change funds									
1. Global Environment Facility									
2. Least Developed Countries Fund									
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund			250,000,000	37,158,659	Committed	ODA	Grant	Cross cutting	Environmental policy and administrative management / 41010
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other									
Subtotal	**0**	**0**	**250,000,000**	**37,158,659**					
Multilateral financial institutions, including regional development banks									
1. World Bank									
World Bank (IDA)	614,220,000	91,294,365			Committed	ODA	Grant		
World Bank (IBRD)	20,000,000	2,972,693	2,400,000	356,723	Committed	ODA	Grant	Adaptation	Other (58% Environmental policy and administrative management / 41010, 42% Food aid/Food security programmes / 52010)
2. International Finance Corporation									
3. African Development Bank	21,449,370	3,188,119			Committed	ODA	Grant		
African Development Bank (AFDF)	180,000,000	26,754,234			Committed	ODA	Grant		
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank			35,000,000	5,202,212	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
7. Other									
Other (IEA)			2,976,000	442,337	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
Subtotal	**835,669,370**	**124,209,412**	**40,376,000**	**6,001,272**					
Specialized United Nations bodies									
1. United Nations Development Programme	345,000,000	51,278,949			Committed	ODA	Grant		
2. United Nations Environment Programme									
3. Other									
Other (United Nations Office of the President of the			1,250,000	185,793	Committed	ODA	Grant	Cross-cutting	Sectors not specified / 99810
Other (UNIDO)	5,900,000	876,944			Committed	ODA	Grant		
Other (WFP)	210,000,000	31,213,273			Committed	ODA	Grant		
Subtotal	**560,900,000**	**83,369,167**	**1,250,000**	**185,793**					
Total	**1,396,569,370**	**207,578,578**	**291,626,000**	**43,345,724**					

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.727907) 6.7279

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2015.1.3 CTF-Table 7b-Committed-2015

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2015[a]

Recipient country/ region/project/programme/activity[b]	Total amount: Climate-specific[f, 2]		Status[c, 3]	Funding source[4]	Financial instrument[5]	Type of support[6]	Sector[d, 7]	Additional Information[e]
	Domestic currency	USD	Committed Disbursed	ODA OOF Other[g]	Grant Concessional loan Non-concessional loan Equity Other[g]	Mitigation Adaptation Cross-cutting[h] Other[g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other[g]	
Afghanistan	1,960	291	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001300ab / Afghanistan Country Programme - TP 3: Growth and Employment
Asia, regional	17,500,000	2,601,106	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2015001246 / Climate Envelope 2015: IUCN - Mangroves for the Future Phase 3 (2015-18)
Bangladesh	3,349,835	497,902	Committed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	CRS 2010001680 / HYSAWA Fund Component
Bangladesh	2,520,000	374,559	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221ac / Climate Change Adaptation and Mittigation Programme
Bangladesh	20,000,000	2,972,693	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2015001187 / Climate Change Adaptation Project Phase II
Bolivia	7,400,000	1,099,896	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001340ab / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	1,035,955	153,979	Committed	ODA	Grant	Cross-Cutting	Forestry development / 31220	CRS 2013001340ac / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Burkina Faso	4,500,000	668,856	Committed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	CRS 2009002442 / Composante 1 Appui au PAGIRE 2
Burkina Faso	285,870	42,490	Committed	ODA	Grant	Adaptation	Agricultural policy and administrative management / 31110	CRS 2012001507ab / Appui à l'entrepreneuriat et au secteur privé agricole
Burkina Faso	4,677,070	695,175	Committed	ODA	Grant	Adaptation	Agricultural financial services / 31193	CRS 2012001507aa / Appui à l'entrepreneuriat et au secteur privé agricole
Burkina Faso	458,315	68,121	Committed	ODA	Grant	Adaptation	Agricultural policy and administrative management / 31110	CRS 2012001508aa / Appui à l'amélioration des conditions cadres du secteur agricole
Burkina Faso	1,350,000	200,657	Committed	ODA	Grant	Cross-Cutting	Forestry research / 31282	CRS 2015001132 / INERA - Restauration et amelioration de la productivite de peuplements de karite au BF
Developing countries, unspecified	10,000,000	1,486,346	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2015001010 / Vedvarende Energi - Rammebevilling 2015-2016
Developing countries, unspecified	61,500,000	9,141,030	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2015001013 / DCA - Rammebevilling 2015 - 2016
Developing countries, unspecified	7,500,000	1,114,760	Committed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	CRS 2015001015 / Verdens Skove - Frame Agreement 2015-2016
Developing countries, unspecified	28,000,000	4,161,770	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2015001016 / Save the Children - Frame Agreement 2015-2016
Developing countries, unspecified	7,500,000	1,114,760	Committed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	CRS 2015001019 / WWF - Frame Agreement 2015-2016
Developing countries, unspecified	60,500,000	8,992,395	Committed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	CRS 2015001025 / IBIS - Frame Agreement 2015-2016
Developing countries, unspecified	762,500	113,334	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001057 / Support to the 92 Group in the area of climate and environment 2015-2016
Developing countries, unspecified	1,500,000	222,952	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001064ab / 3GF2015
Developing countries, unspecified	2,147,935	319,258	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001064aa / 3GF2015
Developing countries, unspecified	11,250,000	1,672,140	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001091 / Support to World Resources Insitute (WRI) 2013-2017
Developing countries, unspecified	10,000,000	1,486,346	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2015001138 / Climate Envelope 2015: Support for CCAP (Centre for Clean Air Policy)
Developing countries, unspecified	1,437,920	213,725	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001149 / CSR Facility 2015: NEPcon
Developing countries, unspecified	707,105	105,100	Committed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	CRS 2015001175aa / Evaluation of Vietnam: Transition from Aide to Trade
Developing countries, unspecified	38,640	5,743	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001215ab / Evaluation of Danida Energy and Environment Co-operation in South East Asia
Developing countries, unspecified	500,000	74,317	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2015001241 / 3ie
Developing countries, unspecified	4,500,000	668,856	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2015001250 / Low Carbon Transition Unit (LCTU)
Georgia	8,900,000	1,322,848	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2015001245ab / Support to Energy Efficiency and Sustainable Energy in Georgia
Georgia	5,850,000	869,513	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2015001245ac / Support to Energy Efficiency and Sustainable Energy in Georgia
Georgia	250,000	37,159	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2015001245aa / Support to Energy Efficiency and Sustainable Energy in Georgia
Indonesia	7,000,000	1,040,442	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2012001386 / Natural Ressourcemanagement and Climate
Indonesia	751,360	111,678	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001215aa / Evaluation of Danida Energy and Environment Co-operation in South East Asia
Kenya	2,500,000	371,587	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002460ab / Component 1. Environmental Policies and Governance
Kenya	1,000,000	148,635	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002460ac / Component 1. Environmental Policies and Governance
Kenya	4,500,000	668,856	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002460aa / Component 1. Environmental Policies and Governance
Kenya	5,500,000	817,490	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002473 / Component 3. Civil Society and Private Sector Management of Natural Resources
Kenya	3,178,565	472,445	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2010001566 / BSPSII/Component 1 - Business Enabling Environment
Kenya	6,877,900	1,022,294	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2010001567 / BSPSII/Component 3 - Innovation and piloting Green Energy
Kenya	1,730,000	257,138	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	CRS 2012001328 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	106,500,000	15,829,589	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001217ab / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	67,500,000	10,032,838	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001217ac / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	9,250,000	1,374,870	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001217ad / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	34,000,000	5,053,578	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2015001217aa / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	40,000,000	5,945,385	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001218ab / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	25,500,000	3,790,183	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2015001218aa / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Malaysia	1,022,500	151,979	Committed	ODA	Grant	Mitigation	Energy education/training / 23181	CRS 2015001182 / High value Opportunity - Malaysia, Energy renovation
Mali	1,429,875	212,529	Committed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	CRS 2009002330ad / Appui au BPO Eau
Mali	7,720,260	1,147,498	Committed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	CRS 2009002330aa / Appui au BPO Eau
Mali	94,200	14,001	Committed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	CRS 2013001258ac / Études, audits, formation, DFC, suivi et évaluation
Mali	37,500,000	5,573,799	Committed	ODA	Grant	Adaptation	Water supply and sanitation - large systems / 14020	CRS 2015001112 / Améliorer l'accés à l'eau et l'assainissement. Programme de transition 2015-2016 2/3
Mozambique	4,000,000	594,539	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001325ab / Climate Change and Environmental Sector Programme Support Phase III
Mozambique	6,000,000	891,808	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001326ab / Climate Change and Environmental Sector Programme Support Phase III
Nepal	2,000,000	297,269	Committed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies /	CRS 2012001347 / NRREP: Central Renewable Energy Fund (CREF) Component
Niger	233,500	34,706	Committed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001157 / Composante 1/Approvisionnement en Eau Potable et Gestion Intégrée de Ressources en Eau
Niger	4,166,500	619,286	Committed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001171 / Assistance technique par Bureaux d'études
Niger	3,500,000	520,221	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001138ab / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Somalia	1,000,000	148,635	Committed	ODA	Grant	Adaptation	Agricultural development / 31120	CRS 2012001418aa / Horn of Africa - comp. 2: FAO and NGO consortium: support to resilience in Somalia
Tanzania	65,000,000	9,661,251	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2013001365ab / BSPS IV - Component 1: Agricultural Markets Development
Uganda	30,000,000	4,459,039	Committed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149ab / Recovery and Development in Northern Uganda
Uganda	17,021,000	2,529,910	Committed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149ac / Recovery and Development in Northern Uganda
Viet Nam	123,230	18,316	Committed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	CRS 2015001175ab / Evaluation of Vietnam: Transition from Aide to Trade
	782,521,995							

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

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[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.727907) 6.7279

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2015.2 Disbursed

2015.2.1 CTF-Table 7-Disbursed-2015

Allocation channels	2015									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,724,196,530	60,376,475	19,400,000	160,458,725	43,221,785	256,275,322	8,974,035	2,883,512	23,849,724	6,424,254
Multilateral climate change funds	100,000,000	0	0	101,035,000	0	14,863,463	0	0	15,017,300	0
Other multilateral climate change funds	0	0	0	0	7,428,490	0	0	0	0	1,104,131
Multilateral financial institutions, including regional development banks	1,005,308,130	60,376,475	4,400,000	37,673,725	35,793,295	149,423,607	8,974,035	653,992	5,599,620	5,320,123
Specialized United Nations bodies	618,888,400	0	15,000,000	21,750,000	0	91,988,251	0	2,229,520	3,232,803	0
Total contributions through bilateral, regional and other channels		236,095,985	87,279,845	601,156,835	0		35,092,041	12,972,808	89,352,727	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		296,472,460	106,679,845	761,615,560	43,221,785		44,066,076	15,856,320	113,202,451	6,424,254
Total climate specific finance		1,207,989,650					179,549,100			

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 6.727907) 6.7279

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2015.2.2 CTF-Table 7a-Disbursed-2015

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2015[a]

Donor funding	Total amount: Core/general[d, 1]: Domestic currency	Total amount: Core/general[d, 1]: USD	Total amount: Climate-specific[e, 2]: Domestic currency	Total amount: Climate-specific[e, 2]: USD	Status[b, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[f])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[f])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[g] / Other[f])	Sector[c, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[f] / Not applicable)	Notes for MFA
Multilateral climate change funds										
1. Global Environment Facility	100,000,000	14,863,463			Disbursed	ODA	Grant			
2. Least Developed Countries Fund										
3. Special Climate Change Fund										
4. Adaptation Fund										
5. Green Climate Fund			100,000,000	14,863,463	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	All core support from multilateral climate funds is counted as climate-specific, except for support to GEF. The DKK 100 mio. in core funding to GCF in 2015 has been moved accordingly. This is different from BR2, where it is counted as core funding. The DKK 1 mio. to UNFCCC is not marked with Rio markers in the CRS data, but is included in MMR 2015. It seems obvius that this is also climate relevant and is therefore included here. The DKK 7.4 mio. funding to Montreal Protocol has been added manually. This support is included in MMR 2015, but it is not attached with Rio markers in CRS++ and it is not marked as core funding.
6. UNFCCC Trust Fund for Supplementary Activities			1,035,000	153,837	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
7. Other (Multilateral Fund for the Implementation of the Montreal Protocol)			7,428,490	1,104,131	Disbursed	ODA	Grant	Other (NA)	Environmental policy and administrative management / 41010	
Subtotal	**100,000,000**	**14,863,463**	**108,463,490**	**16,121,431**						
Multilateral financial institutions, including regional development banks										MMR 2015 include no climate-specific support going through Multilateral or Regional Banks, or through UN institutions. Some of these funds are instead included as Bilateral funding (Table 7b), but the figures here are DKK 135 mio. higher in total than MMR 2015. As with MMR 2016, we suggest that this funding going through multilateral institutions is included, as it was in BR2.
1. World Bank										
World Bank (IDA)	614,220,000	91,294,365	4,600,000	683,719	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	DKK 88 mio. in core support to IDA Multilateral Debt Relief Initiative is not included in the core support to the World Bank in BR2. We suggest they are also not included here.
World Bank (IBRD)	10,000,000	1,486,346	22,379,820	3,326,416	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	
World Bank (IBRD)			4,400,000	653,992	Disbursed	ODA	Grant	Adaptation	Other (68% Food aid/Food security programmes / 52010; 32% Environmental policy and administrative management / 41010)	
2. International Finance Corporation	12,500,000	1,857,933	2,500,000	371,587	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Core support to IFC is in BR2 added to the overall WB support, but since it is seperated in the table from UNFCCC we have also seperated it here.
3. African Development Bank	15,881,220	2,360,499	556,155	82,664	Disbursed	ODA	Grant	Mitigation	Other (89% Energy generation, renewable sources – multiple technologies / 23210; 11% Financial policy and administrative management / 24010)	
African Development Bank (AFDF)	179,558,580	26,688,624			Disbursed	ODA	Grant			
4. Asian Development Bank										
Asian Development Bank (AsDF)	66,615,850	9,901,423			Disbursed	ODA	Grant			
5. European Bank for Reconstruction and Development										
6. Inter-American Development Bank			37,440,500	5,564,955	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	
7. Other (CGIAR)	70,000,000	10,404,424			Disbursed	ODA	Grant			
Other (GGGI)			30,573,725	4,544,314	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	In 2013 and 2014 reporting (BR2 and MMR), support to GGGI is classified under multilateral climate funds, but in MMR 2015 (and 2016) GGGI is put under Multilateral financial institutions. We have put it here again. The support to GGGI is core support, but has here been put as climate-specific (as requested by MFA for MMR2016).
Other (Nordic Development Fund)	36,532,480	5,429,992			Disbursed	ODA	Grant			
Other (Other multilateral institutions)			35,793,295	5,320,123	Disbursed	ODA	Grant	Other (NA)	Other (NA)	The DKK 36 mio. to other multilateral institutions include DKK 7.5 mio. for Mekong River Commission, DKK 14.3 mio. for Intergovernmental Authority on Development, DKK 3 mio. for IEA, DKK 2 mio. to SADC, and DKK 8.9 mio. for OECD. This could be spread out individually, but it would require 6 additional lines to be included in the table.
Subtotal	**1,005,308,130**	**149,423,607**	**138,243,495**	**20,547,771**						
Specialized United Nations bodies										
1. United Nations Development Programme	345,000,000	51,278,949			Disbursed	ODA	Grant			
2. United Nations Environment Programme	30,000,000	4,459,039	15,000,000	2,229,520	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
3. Other										
Other (FAO)			15,000,000	2,229,520	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	
Other (IFAD)	28,000,000	4,161,770			Disbursed	ODA	Grant			
Other (UNIDO)	5,888,400	875,220			Disbursed	ODA	Grant			
Other (WFP)	210,000,000	31,213,273			Disbursed	ODA	Grant			
Other (United Nations Office of the President of the General Assembly)			1,250,000	185,793	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	
Other (United Nations Office for Project Services)			5,500,000	817,490	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
Subtotal	**618,888,400**	**91,988,251**	**36,750,000**	**5,462,323**						
Total	**1,724,196,530**	**256,275,322**	**283,456,985**	**42,131,525**						

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.727907) 6.7279

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2015.2.3 CTF-Table 7b-Disbursed-2015

Recipient country/ region/project/programme	Domestic currency	USD	Status	Funding source	Financial instrument	Type of support	Sector	Recipient country or region	Additional information
Kenya	9,319,390	1,385,184	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	CRS 2012001327 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	3,303,110	490,957	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	CRS 2012001328 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	246,140	36,585	Disbursed	ODA	Grant	Adaptation	Business support services and institutions / 25010	Kenya	CRS 2012001329 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	92,865	13,803	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Kenya	CRS 2014001385 / Real-Time Evaluation of the Danida Country Programme for Kenya
Mali	1,111,100	165,148	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Mali	CRS 2009002134 / Projet de faisabilité des ressources de l'énergie renouvelables au Mali
Mali	2,035,555	302,554	Disbursed	ODA	Grant	Mitigation	Basic drinking water supply and basic sanitation / 14030	Mali	CRS 2009002330ac / Appui au BPO Eau
Mali	1,351,355	200,858	Disbursed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	Mali	CRS 2009002330ad / Appui au BPO Eau
Mali	7,571,770	1,125,427	Disbursed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	Mali	CRS 2009002330aa / Appui au BPO Eau
Mali	360,000	53,508	Disbursed	ODA	Grant	Mitigation	Energy generation, non-renewable sources – unspecified / 23310	Mali	CRS 2013001146 / Projet de faisabilité d'une centrale thermique à déchets à Bamako
Mali	8,426,385	1,252,453	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001256 / Développement et amélioration des infrastructures (composant 2)
Mali	9,924,775	1,475,165	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001257 / Renforcement des capacités et des compétences (composant 3)
Mali	49,730	7,392	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Mali	CRS 2013001258ab / Études, audits, formation, DFC, suivi et évaluation
Mali	56,420	8,386	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001258ac / Études, audits, formation, DFC, suivi et évaluation
Mali	209,525	31,113	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001258aa / Études, audits, formation, DFC, suivi et évaluation
Mali	6,810,120	1,012,220	Disbursed	ODA	Grant	Adaptation	Water supply and sanitation - large systems / 14020	Mali	CRS 2015001112 / Améliorer l'accès à l'eau et l'assainissement. Programme de transition 2015-2016 2/3
Mexico	38,310	5,694	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	CRS 2013001557ab / Climate Envelope 2013: Climate change mitigation and energy in Mexico
Mexico	14,904,750	2,215,362	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	CRS 2013001557aa / Climate Envelope 2013: Climate change mitigation and energy in Mexico
Middle East, regional	1,202,780	178,775	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Middle East, regional	CRS 2010001507 / MERAP - Middle East Regional Agri. Prog.
Mozambique	1,077,550	160,161	Disbursed	ODA	Grant	Cross-Cutting	Environmental research / 41082	Mozambique	CRS 2010001416ab / Komponent 1
Mozambique	15,259,800	2,268,135	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001416aa / Komponent 1
Mozambique	2,262,010	336,213	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001458 / Component 3
Mozambique	965,305	143,478	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001460 / Administration/review
Mozambique	2,879,065	427,929	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001461ab / Component 2-Municipalities
Mozambique	10,144,020	1,507,753	Disbursed	ODA	Grant	Cross-Cutting	Decentralisation and support to subnational government / 15112	Mozambique	CRS 2010001461aa / Component 2-Municipalities
Mozambique	1,379,670	205,067	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001325ab / Climate Change and Environmental Sector Programme Support Phase III
Mozambique	2,000,000	297,269	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001326ab / Climate Change and Environmental Sector Programme Support Phase III
Mozambique	1,507,690	224,095	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001326aa / Climate Change and Environmental Sector Programme Support Phase III
Myanmar	875,000	130,055	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Myanmar	CRS 2013001078 / (GRET) Myanmar Farmers Innovating for Rural development and Environmental restoration, MyFIRE
Nepal	7,750,000	1,151,918	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies / 232	Nepal	CRS 2012001347 / NRREP: Central Renewable Energy Fund (CREF) Component
Nepal	5,150,000	765,468	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies / 232	Nepal	CRS 2012001360 / NRREP: Technical Support Component
Nepal	1,000,000	148,635	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	Nepal	CRS 2012001361 / NRREP: Productive Energy Component
Nepal	205,945	30,611	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	Nepal	CRS 2012001363 / NRREP: Reviews, Audit and Studies
Nepal	426,820	63,440	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	CRS 2013001129 / DBP Nepal Fertiliser Industries and Biosa ApS
Nepal	705,405	104,848	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	CRS 2014001100 / Mirage Printing Solution P. Ltd and Nilpeter A/S
Niger	244,770	36,381	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Niger	CRS 2008001524ab / Rural development Support in Diffa and Zinder regions
Niger	781,520	116,161	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	Niger	CRS 2008001524aa / Rural development Support in Diffa and Zinder regions
Niger	19,777,085	2,939,560	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001157 / Composante 1/Approvisionnement en Eau Potable et Gestion Intégrée de Ressources en Eau
Niger	7,927,115	1,178,244	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001158 / Composante 2/ Promotion de l'Hygiène et de l'Assainissement de Base
Niger	486,205	72,267	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001160 / Conseiller Danida
Niger	2,200,385	327,053	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001171 / Assistance technique par Bureaux d'études
Niger	123,215	18,314	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001172 / Revues, Audits, études et formulation de la 3ème phase du programme
Niger	21,670	3,221	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	CRS 2014001138ab / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Niger	5,283,770	785,351	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	CRS 2014001138ac / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Niger	172,395	25,624	Disbursed	ODA	Grant	Cross-Cutting	Agricultural policy and administrative management / 31110	Niger	CRS 2014001138aa / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Philippines	482,420	71,704	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Philippines	CRS 2004001292 / Ilocos Norte, Bangui Bay Wind Farm Project, Phase II
Serbia	297,165	44,169	Disbursed	ODA	Grant	Adaptation	Agricultural services / 31191	Serbia	CRS 2010001509 / Private Sector Programme in Serbia, capacity building
Serbia	4,266,540	634,156	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001510 / Private Sector Programme in Serbia, Financing facility
Serbia	1,222,505	181,707	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001511 / Administration incl. audit and review
Serbia	359,300	53,404	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001512 / Adviser
Somalia	6,000,000	891,808	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Somalia	CRS 2012001418aa / Horn of Africa - comp. 2: FAO and NGO consortium: support to resilience in Somalia
South Africa	12,394,240	1,842,213	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	South Africa	CRS 2012001288 / Climate Envelope 2012: South Africa - low carbon transition in the energy efficiency sector
South Africa	402,975	59,896	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	South Africa	CRS 2013001141 / Private/Public Partnership Project in the Water Sector
South of Sahara, regional	989,275	147,041	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	South of Sahara, regional	CRS 2013001212 / CSR-Facility: Establishment and implementation of international standards for sustainable and traceable cocoa
South of Sahara, regional	202,230	30,058	Disbursed	ODA	Grant	Mitigation	Trade facilitation / 33120	South of Sahara, regional	CRS 2013001326 / Organic Denmark - project identification for the project ECOMEA 'Enhancing the capacity of the organic movements in East Africa'
Tanzania	12,120	1,801	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001286 / EMA-ISP Component 1
Tanzania	357,925	53,200	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001287ab / UDEM - Component 2
Tanzania	6,499,655	966,074	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001287aa / UDEM - Component 2
Tanzania	50,390	7,490	Disbursed	ODA	Grant	Mitigation	Forestry policy and administrative management / 31210	Tanzania	CRS 2007001291 / PFM - Component 3
Tanzania	589,250	87,583	Disbursed	ODA	Grant	Mitigation	Water transport / 21040	Tanzania	CRS 2013001193 / Renewal of Ferry Fleet on Lake Victoria, Lake Tanganyika and Lake Nyasa: Support to Detailed Design and Tendering
Tanzania	1,292,665	192,135	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Tanzania	CRS 2013001365aa / BSPS IV - Component 1: Agricultural Markets Development
Turkey	706,950	105,077	Disbursed	ODA	Grant	Mitigation	Urban development and management / 43030	Turkey	CRS 2015001163 / Tyrkiet. Danish-Turkish Strategic Sector Cooperation (energy, environment, research)
Uganda	45,030	6,693	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2008001259 / B2B Konserve Consult Ltd and Energimidt A/S
Uganda	107,950	16,045	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2009002060 / Restoration of Agricultural Livelihood in Northern Uganda
Uganda	848,955	126,184	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2009002325 / Agribusiness Development Initiative
Uganda	8,185	1,217	Disbursed	ODA	Grant	Cross-Cutting	Culture and recreation / 16061	Uganda	CRS 2010001581 / Youth Cultures Project
Uganda	104,600	15,547	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2011001556 / Firmenich and Uvan
Uganda	387,100	57,536	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2012001213 / International Woodland Company and Continental Forests Ltd.
Uganda	1,514,270	225,073	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	Uganda	CRS 2012001411 / An integrated approach to natural resources management in Northern Uganda
Uganda	17,424,630	2,589,904	Disbursed	ODA	Grant	Cross-Cutting	Water supply - large systems / 14021	Uganda	CRS 2013001184 / Sector Budget Support for Rural Water Supply
Uganda	8,300,000	1,233,667	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Uganda	CRS 2013001325 / Climate Envelope 2013: Pro-poor REDD (IUCN), ph. 2
Uganda	27,501,840	4,087,726	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001353 / Joint Partnership Fund-basket
Uganda	4,649,830	691,126	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001354 / Long term technical assistance
Uganda	150,040	22,301	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001355 / Administration/review
Uganda	16,967,130	2,521,903	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2014001147 / Agribusiness Initiative - aBi Trust & aBi Finance
Uganda	5,644,520	838,971	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149ab / Recovery and Development in Northern Uganda
Uganda	1,926,115	286,287	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149ac / Recovery and Development in Northern Uganda
Uganda	3,005,895	446,780	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149aa / Recovery and Development in Northern Uganda
Uganda	348,840	51,850	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Uganda	CRS 2014001151 / Reviews and Studies
Ukraine	3,697,115	549,519	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 232	Ukraine	CRS 2014001401ab / Renewable Energy and Energy Efficiency Programme 2014-17.
Ukraine	5,250,000	780,332	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 232	Ukraine	CRS 2014001401aa / Renewable Energy and Energy Efficiency Programme 2014-17.
Viet Nam	2,535,195	376,818	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	Viet Nam	CRS 2006001132 / Technical assistance
Viet Nam	116,500	17,316	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Viet Nam	CRS 2006001133 / Programme management
Viet Nam	223,855	33,273	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	Viet Nam	CRS 2007001119 / Central component
Viet Nam	4,131,920	614,146	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2008001365 / Support to National Target Programme on Climate Change
Viet Nam	518,830	77,116	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Viet Nam	CRS 2008001366 / Support to National Energy Efficiency Programme
Viet Nam	891,240	132,469	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2008001367 / Programme management
Viet Nam	507,350	75,410	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2011001479ab / Renewable Energy Water Supply for the Mekong Delta
Viet Nam	129,740	19,284	Disbursed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	Viet Nam	CRS 2011001479aa / Renewable Energy Water Supply for the Mekong Delta
Viet Nam	2,317,540	344,467	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Viet Nam	CRS 2012001287ab / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	925,460	137,555	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2012001287ac / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	1,457,450	216,628	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2012001287aa / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	31,790	4,725	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Viet Nam	CRS 2012001486 / Danish support to Reduction of Non-Revenue Water in Vietnam
Viet Nam	442,595	65,785	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2013001198 / DBP: University of Can Tho and Oxy Guard International A/S
Viet Nam	1,191,460	177,092	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Viet Nam	CRS 2014001106ab / Evaluation of the Danish Climate Change Funding to Developing Countries
Viet Nam	923,600	137,144	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2015001216 / DBP Thuy San JSC and C.F. Nielsen A/S
Viet Nam	98,230	14,600	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Viet Nam	CRS 2015001175ab / Evaluation of Vietnam: Transition from Aide to Trade
Zambia	44,450	6,607	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Zambia	CRS 2008001481 / Program reviews
Zambia	316,035	46,974	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	Zambia	CRS 2011001391 / Rural Water Supply and Sanitation

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

a Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

b Parties should report, to the extent possible, on details contained in this table.

c Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Partie

d Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

e Parties should report, as appropriate, on project details and the implementing agency.

f Parties should explain in their biennial reports how they define funds as being climate-specific.

g Please specify.

h This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.727907) 6.7279

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

Exchange rate (USD 1 = DKK 6.727907), Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

2016 CTF Table 7-, 7a- and 7b-formats

2016.1 Committed

2016.1.1 CTF-Table 7-Committed-2016

Allocation channels	2016									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,507,330,000	45,502,500	197,000,000	40,500,000	1,500,000	223,914,608	6,759,419	29,264,446	6,016,295	222,826
Multilateral climate change funds	0	0	156,000,000	0	0	0	0	23,173,876	0	0
Other multilateral climate change funds	0	0	0	0	1,500,000	0	0	0	0	222,826
Multilateral financial institutions, including regional development banks	1,073,220,000	45,502,500	0	14,500,000	0	159,427,356	6,759,419	0	2,153,982	0
Specialized United Nations bodies	434,110,000	0	41,000,000	26,000,000	0	64,487,253	0	6,090,570	3,862,313	0
Total contributions through bilateral, regional and other channels		213,209,887	196,826,524	162,607,236	0		31,672,433	29,238,676	24,155,384	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		258,712,387	393,826,524	203,107,236	1,500,000		38,431,852	58,503,123	30,171,679	222,826
Total climate specific finance		857,146,147					127,329,479			

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 6.731718) 6.7317

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2016.1.2 CTF-Table 7a-Committed-2016

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2016[a]

Donor funding	Total amount				Status[b, 3]	Funding source[4]	Financial instrument[5]	Type of support[6]	Sector[c, 7]
	Core/general[d, 1]		Climate-specific[e, 2]						
	Domestic currency	USD	Domestic currency	USD	Committed Disbursed	ODA OOF Other[f]	Grant Concessional loan Non-concessional loan Equity Other[f]	Mitigation Adaptation Cross-cutting[g] Other[f]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other[f] Not applicable
Multilateral climate change funds									
1. Global Environment Facility									
2. Least Developed Countries Fund			156,000,000	23,173,876	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other (Multilateral Fund for the Implementation of the Montreal Protocol)			1,500,000	222,826	Committed	ODA	Grant	Other (NA)	Environmental policy and administrative management / 41010
Subtotal	**0**	**0**	**157,500,000**	**23,396,702**					
Multilateral financial institutions, including regional development banks									
1. World Bank			6,000,000	891,303	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110
World Bank (IDA)	664,220,000	98,670,206			Committed	ODA	Grant		
World Bank (IBRD)			14,500,000	2,153,982	Committed	ODA	Grant	Cross-cutting	Agricultural development / 31120
World Bank (IBRD)			25,500,000	3,788,037	Committed	ODA	Grant	Mitigation	Other (55% Environmental policy and administrative management / 41010, 45% Wind energy / 23240)
2. International Finance Corporation									
3. African Development Bank	6,000,000	891,303			Committed	ODA	Grant		
African Development Bank (AFDF)	403,000,000	59,865,847			Committed	ODA	Grant		
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other									
Other (OECD)			2,500	371	Committed	ODA	Grant	Mitigation	Research/scientific institutions / 43082
Other (IEA)			14,000,000	2,079,707	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110
Subtotal	**1,073,220,000**	**159,427,356**	**60,002,500**	**8,913,401**					
Specialized United Nations bodies									
1. United Nations Development Programme	210,000,000	31,195,603			Committed	ODA	Grant		
2. United Nations Environment Programme	9,000,000	1,336,954	11,000,000	1,634,055	Committed	ODA	Grant	Cross-cutting	Environmental policy and administrative management / 41010
United Nations Environment Programme			1,500,000	222,826	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010
3. Other									
Other (IFAD)			15,000,000	2,228,257	Committed	ODA	Grant	Cross-Cutting	Agricultural policy and administrative management / 31110
Other (UNIDO)	5,110,000	759,093			Committed	ODA	Grant		
Other (UNICEF)			19,500,000	2,896,735	Committed	ODA	Grant	Adaptation	Civilian peace-building, conflict prevention and resolution / 15220
Other (WFP)	210,000,000	31,195,603			Committed	ODA	Grant		
Other (FAO)			20,000,000	2,971,010	Committed	ODA	Grant	Adaptation	Civilian peace-building, conflict prevention and resolution / 15220
Subtotal	**434,110,000**	**64,487,253**	**67,000,000**	**9,952,883**					
Total	**1,507,330,000**	**223,914,608**	**284,502,500**	**42,262,985**					

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.731718) 6.7317

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2016.1.3 CTF-Table 7b-Committed-2016

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2016[a]

Recipient country/ region/project/programme/activity[b]	Total amount: Climate-specific[f, 2] Domestic currency	Total amount: Climate-specific[f, 2] USD	Status[c, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[g])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[g])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[h] / Other[g])	Sector[d, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[g])	Additional Information[e]	
Afghanistan	45,000,000	6,684,772	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2014001300aa / Landeprogram Afghanistan - TP 3: Vækst og Beskæftigelse	
Bangladesh	2,800,000	415,941	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2014001221ac / Climate Change Adaptation and Mittigation Programme	
Bangladesh	85,000,000	12,626,792	Committed	ODA	Grant	Adaptation	Rural development / 43040	CRS 2016001117 / Thematic Programme Climate Change and Sustainable Enem	"Cross-cutting" to "Adaptation"
Bangladesh	1,000,000	148,550	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2016001275 / LGA CPD 2016	
Bangladesh	710,157	105,494	Committed	ODA	Grant	Cross-Cutting	Basic drinking water supply / 14031	CRS 2016001292 / High value opportunity - Distribution networks of Padma Water Treatment Plant, Dhaka, Bangladesh	
Bolivia	350,000	51,993	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001398 / Øget værditilvækst især i små og mellemstore virksomheder, med mest fokus på forarbejdning af landbrugsvarer	
Bolivia	150,000	22,283	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2010001402 / Administration, rådgivning og control	
Bolivia	350,000	51,993	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2013001340aa / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding	
Bolivia	1,242,500	184,574	Committed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	CRS 2013001378ad / Landeprogram Bolivia - del I: Fremme af inklusiv og bæredygtig økonomisk vækst	
Bolivia	699,899	103,970	Committed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	CRS 2016001175 / Evaluation of the Danish engagement in Bolivia 1994-2016	
Brazil	2,160,000	320,869	Committed	ODA	Equity	Mitigation	Industrial policy and administrative management / 32110	CRS 2016320078 / (tom)	
Burkina Faso	3,597,500	534,410	Committed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	CRS 2009002442 / Component 1 Support to Integrated Water Resources Management PAGIRE 2)	
Burkina Faso	37,500,000	5,570,643	Committed	ODA	Grant	Cross-Cutting	General budget support-related aid / 51010	CRS 2015001299 / General Budget Support Burkina Faso	
Burkina Faso	27,000,000	4,010,863	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2015001306 / Eau et Assainissement 2016-2020	
China (People's Republic of)	26,704,800	3,967,011	Committed	ODA	Equity	Mitigation	Solar energy / 23230	CRS 2016320080 / (tom)	
China (People's Republic of)	333,985	49,614	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2016001142 / Strategic sector cooperation Water and Environment, China	Added manually. No Rio marker in CRS++
Developing countries, unspecified	13,719	2,038	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002362 / Bæredygtig Naturressourceforvaltning	
Developing countries, unspecified	7,500,000	1,114,129	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2016001031 / Vedvarende Energi - Rammebevilling 2015-2017	
Developing countries, unspecified	11,800,000	1,752,896	Committed	ODA	Grant	Mitigation	Forestry policy and administrative management / 31210	CRS 2016001032 / Verdens Skove - Rammebevilling 2015-2017	
Developing countries, unspecified	5,550,000	824,455	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2016001033 / WWF - Rammebevilling 2015-2017	
Developing countries, unspecified	31,500,000	4,679,340	Committed	ODA	Grant	Adaptation	Material relief assistance and services / 72010	CRS 2016001043 / Folkekirkens Nødhjælp humanitær partnerskabsaftale 2016	
Developing countries, unspecified	1,100,000	163,406	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2016001080 / Support to the 92 Group in the area of climate and environment 2015-2017	
Developing countries, unspecified	5,000,000	742,752	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2016001084aa / 3GF 2016	
Developing countries, unspecified	13,000,000	1,931,156	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2016001111 / Klimapuljen 2016: Forlængelse af Low Carbon Transition Unit (LCTU) - Danish Energy Agency Energy Partnership (DEA EP)	
Developing countries, unspecified	23,000,000	3,416,661	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2016001144 / IFU Development Program	
Developing countries, unspecified	4,800,000	713,042	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2016001145 / Dansk støtte til NDC-partnerskab	
Developing countries, unspecified	5,000,000	742,752	Committed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	CRS 2016001200aa / IISD and WB - Support to Sustainable Energy systems via Fossil Fuel Subsidy Reform (FFSR) Swaps & knowledge sharing 2017-2019	
Developing countries, unspecified	4,000,000	594,202	Committed	ODA	Grant	Adaptation	Agro-industries / 32161	CRS 2016001204 / DMDP - Landbrug og Fødevarer, Nigeria	
Developing countries, unspecified	8,000,000	1,188,404	Committed	ODA	Grant	Mitigation	Wind energy / 23240	CRS 2016001213 / DMDP - Vedvarende Energi, Kenya	
Developing countries, unspecified	29,550,000	4,389,667	Committed	ODA	Grant	Adaptation	Sectors not specified / 99810	CRS 2016001021 / Røde Kors - Rammebevilling 2015-2017	Added manually. No Rio marker in CRS++
Developing countries, unspecified	19,200,000	2,852,169	Committed	ODA	Grant	Adaptation	Multisector aid for basic social services / 16050	CRS 2016001018 / CARE - Rammebevilling 2015-2017	Added manually. No Rio marker in CRS++
Developing countries, unspecified	10,700,000	1,589,490	Committed	ODA	Grant	Adaptation	Multisector aid for basic social services / 16050	CRS 2016001019 / Caritas - Rammebevilling 2015-2017	Added manually. No Rio marker in CRS++
Ethiopia	16,500,000	2,451,083	Committed	ODA	Grant	Mitigation	Wind energy / 23240	CRS 2016001197aa / Accelerating Wind Power Generation in Ethiopia (2016-2019)	
Ethiopia	4,000,000	594,202	Committed	ODA	Grant	Cross-Cutting	Agro-industries / 32161	CRS 2016001216 / DMDP - GAIN, Ethiopia	
Ghana	10,997,180	1,633,637	Committed	ODA	Grant	Cross-Cutting	Education facilities and training / 11120	CRS 2012001203ab / Establishment of Environmental Monitoring Laboratory at the University of Mines and Technology (UMaT) Project	
India	6,319,040	938,696	Committed	ODA	Equity	Mitigation	Sanitation - large systems / 14022	CRS 2016320082 / (tom)	
Kenya	6,000,000	891,303	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	CRS 2009002473 / Komponent 3. Fattigdomsbekæmpelse gennem civilsamfund/den private sektor	
Kenya	3,322,500	493,559	Committed	ODA	Grant	Adaptation	Food crop production / 31161	CRS 2016001214 / DMDP - CARE Denmark, Kenya	
Mozambique	1,000,000	148,550	Committed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	CRS 2010001461 / (tom)	
Myanmar	1,218,950	181,076	Committed	ODA	Grant	Adaptation	Fishery development / 31320	CRS 2016001157ab / Real-Time Evaluation of Sustainable Coastal Fisheries, Myanmar	
Myanmar	31,050	4,612	Committed	ODA	Grant	Adaptation	Fishery development / 31320	CRS 2016001157aa / Real-Time Evaluation of Sustainable Coastal Fisheries, Myanmar	
Myanmar	30,856,170	4,583,699	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2016001190ab / Country Programme 2016-2020. ISEG Thematic Programme: Inclusive and Sustainable Economic Growth	
Myanmar	7,143,830	1,061,219	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2016001190ac / Country Programme 2016-2020. ISEG Thematic Programme: Inclusive and Sustainable Economic Growth	
Myanmar	42,000,000	6,239,121	Committed	ODA	Grant	Mitigation	Business support services and institutions / 25010	CRS 2016001190aa / Country Programme 2016-2020. ISEG Thematic Programme: Inclusive and Sustainable Economic Growth	
Niger	1,500,000	222,826	Committed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	CRS 2012001157 / Vandprogrammet i Niger (PASEHA2)/ Komponent 1	
South Africa	1,249,963	185,683	Committed	ODA	Grant	Adaptation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2016001278 / DI Improving the public-private Water provision SA	
South Africa	554,062	82,306	Committed	ODA	Grant	Adaptation	Water sector policy and administrative management / 14010	CRS 2016001102 / South African - Danish Strategic Sector Cooperation on Wa	Added manually. No Rio marker in CRS++
South Sudan	10,500,000	1,559,780	Committed	ODA	Grant	Adaptation	Civilian peace-building, conflict prevention and resolution / 15220	CRS 2016001221aa / Country Programme for South Sudan 2016-2018	
Uganda	4,250,000	631,340	Committed	ODA	Grant	Cross Cutting	Water sector policy and administrative management / 14010	CRS 2013001354 / Langsigtet teknisk bistand	
Uganda	3,650,000	542,209	Committed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	CRS 2013001355 / Administration/review	
Uganda	3,957,500	587,889	Committed	ODA	Grant	Cross-Cutting	Rural development / 43040	CRS 2014001149aa / xxxx	
Uganda	1,280,844	190,270	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 3213(	CRS 2016001286 / Improved access to Green Energy Uganda	Manually changed from "Cross-cutting" to "Mitigation" and from Rio marker 1 to 2 (doubled)
Ukraine	2,000,000	297,101	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies /	CRS 2014001401ac / Renewable Energy and Energy Efficiency Programme 2014-17.	
	572,643,647	85,066,494							

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations : ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.731718) 6.7317

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

2016.2 DISBURSED

2016.2.1 CTF-Table 7-Disbursed-2016

Allocation channels	2016									
	Domestic currency					USD[b]				
	Core/ general[c, 1]	Climate-specific[d, 2]				Core/ general[c]	Climate-specific[d, 2]			
		Mitigation	Adaptation	Cross-cutting[e]	Other[f]		Mitigation	Adaptation	Cross-cutting[e]	Other[f]
Total contributions through multilateral channels:	1,612,561,003	105,096,975	62,030,309	119,803,678	7,428,485	239,546,725	15,612,207	9,214,633	17,796,895	1,103,505
Multilateral climate change funds	100,000,000	0	44,219,978	50,000,000	0	14,855,049	0	6,568,899	7,427,524	0
Other multilateral climate change funds	0	0	0	0	7,428,485	0	0	0	0	1,103,505
Multilateral financial institutions, including regional development banks	1,078,469,757	77,665,395	60,331	55,486,873	0	160,207,210	11,537,232	8,962	8,242,602	0
Specialized United Nations bodies	434,091,246	27,431,580	17,750,000	14,316,805	0	64,484,467	4,074,975	2,636,771	2,126,768	0
Total contributions through bilateral, regional and other channels		241,306,872	186,125,839	571,314,381	0		35,846,254	27,649,084	84,869,031	0
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		346,403,847	248,156,148	691,118,059	7,428,485		51,458,461	36,863,717	102,665,925	1,103,505
Total climate specific finance		1,293,106,538					192,091,608			

Note : Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).
Abbreviation : USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.
[b] Parties should provide an explanation of the methodology used for currency exchange for the information provided in tables 7, 7(a) and 7(b) in the documentation box.
[c] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.
[d] Parties should explain in their biennial reports how they define funds as being climate-specific.
[e] This refers to funding for activities that are cross-cutting across mitigation and adaptation.
[f] Please specify.
[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.
[h] Other multilateral climate change funds as referred to in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 6.731718) 6.7317
Source: OECD
https://data.oecd.org/conversion/exchange-rates.htm

2016.2.2 CTF-Table 7a-Disbursed-2016

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2016[a]

Donor funding	Total amount: Core/general[d, 1] Domestic currency	Total amount: Core/general[d, 1] USD	Total amount: Climate-specific[e, 2] Domestic currency	Total amount: Climate-specific[e, 2] USD	Status[b, 3] (Committed / Disbursed)	Funding source[4] (ODA / OOF / Other[f])	Financial instrument[5] (Grant / Concessional loan / Non-concessional loan / Equity / Other[f])	Type of support[6] (Mitigation / Adaptation / Cross-cutting[g] / Other[f])	Sector[c, 7] (Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[f] / Not applicable)	Notes for MFA
Multilateral climate change funds										
1. Global Environment Facility	100,000,000	14,855,049			Disbursed	ODA	Grant			
2. Least Developed Countries Fund			44,219,978	6,568,899	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	All core support from multilateral climate funds is counted as climate-specific, except for support to GEF.
3. Special Climate Change Fund										
4. Adaptation Fund										
5. Green Climate Fund			50,000,000	7,427,524	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
6. UNFCCC Trust Fund for Supplementary Activities										
7. Other (Multilateral Fund for the Implementation of the Montreal Protocol)			7,428,485	1,103,505	Disbursed	ODA	Grant	Other (NA)	Environmental policy and administrative management / 41010	The DKK 7.4 mio. funding to Montreal Protocol has been added manually. This support is included in MMR 2015, but it is not attached with Rio markers in CRS++ and it is not marked as core funding. It is NOT included in MMR 2016.
Subtotal	**100,000,000**	**14,855,049**	**101,648,463**	**15,099,929**						
Multilateral financial institutions, including regional development banks										
1. World Bank			3,000,000	445,651	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	
World Bank (IDA)	664,220,000	98,670,206			Disbursed	ODA	Grant			DKK 92 mio. in core support to IDA Multilateral Debt Relief Initiative is not included in the core support to the World Bank in BR2. We suggest they are also not included here. NOTE: The IDA-MDRI funds ARE included in MMR 2016.
World Bank (IBRD)	3,000,000	445,651	22,138,358	3,288,664	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	
World Bank (IBRD)			64,671,807	9,607,029	Disbursed	ODA	Grant	Mitigation	Other (73% Environmental policy and administrative management / 41010; 20% Energy policy and administrative management / 23110; 7% Wind energy / 23240)	
2. International Finance Corporation	7,000,000	1,039,853	4,275,000	635,053	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
3. African Development Bank	1,282,164	190,466	49,975	7,424	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	
African Development Bank (AFDF)	402,967,594	59,861,033			Disbursed	ODA	Grant			
4. Asian Development Bank										
5. European Bank for Reconstruction and Development										
6. Inter-American Development Bank										
7. Other (GGGI)			29,073,515	4,318,885	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	In 2013 and 2014 reporting (BR2 and MMR), support to GGGI is classified under multilateral climate funds, but in MMR 2015 (and 2016) GGGI is put under Multilateral financial institutions. We have put it here again. The support to GGGI is core support, but has here been put as climate-specific (as requested by MFA for MMR2016).
Other (OECD)			1,543,614	229,305	Disbursed	ODA	Grant	Mitigation	Other (78% Environmental policy and administrative management / 41010; 22% Research/scientific institutions / 43082)	
Other (IEA)			8,400,000	1,247,824	Disbursed	ODA	Grant	Mitigation	Other (76% Environmental policy and administrative management / 41010; 24% Energy policy and administrative management / 23110)	
Other (Inter-Governmental Authority on Development)			60,331	8,962	Disbursed	ODA	Grant	Adaptation	Agricultural land resources / 31130	
Subtotal	**1,078,469,757**	**160,207,210**	**133,212,599**	**19,788,797**						
Specialized United Nations bodies										
1. United Nations Development Programme	210,000,000	31,195,603	27,431,580	4,074,975	Disbursed	ODA	Grant	Mitigation	Other (73% Energy policy and administrative management / 23110; 27% Environmental policy and administrative management / 41010)	
2. United Nations Environment Programme	9,000,000	1,336,954	6,245,805	927,817	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
United Nations Environment Programme			1,500,000	222,826	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	
3. Other										
Other (FAO)			8,000,000	1,188,404	Disbursed	ODA	Grant	Adaptation	Civilian peace-building, conflict prevention and resolution / 15220	
Other (IFAD)			2,571,000	381,923	Disbursed	ODA	Grant	Cross-Cutting	Agricultural policy and administrative management / 31110	
Other (UNIDO)	5,091,246	756,307			Disbursed	ODA	Grant			
Other (WFP)	210,000,000	31,195,603			Disbursed	ODA	Grant			
Other (UNICEF)			8,250,000	1,225,542	Disbursed	ODA	Grant	Adaptation	Civilian peace-building, conflict prevention and resolution / 15220	
Other (United Nations Office for Project Services)			5,500,000	817,028	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	
Subtotal	**434,091,246**	**64,484,467**	**59,498,385**	**8,838,514**						
Total	**1,612,561,003**	**239,546,725**	**294,359,447**	**43,727,240**						

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as being climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.731718)	6.7317
Source: OECD	
https://data.oecd.org/conversion/exchange-rates.htm	

2016.2.3 CTF-Table 7b-Disbursed-2016

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2016[a]

Project/programme/activity								Recipient country or region	
Recipient country/ region/project/programme/activity[b]	Total amount: Climate-specific[f, 2] Domestic currency	Total amount: Climate-specific[f, 2] USD	Status[c, 3] Committed / Disbursed	Funding source[4] ODA / OOF / Other[g]	Financial instrument[5] Grant / Concessional loan / Non-concessional loan / Equity / Other[g]	Type of support[6] Mitigation / Adaptation / Cross-cutting[h] / Other[g]	Sector[d, 7] Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other[g]		Additional information[e]
Afghanistan	19,500,000	2,896,735	Disbursed	ODA	Grant	Mitigation	Public sector policy and administrative management / 15110	Afghanistan	CRS 2013001246 / Støtte til National Solidarity Programme (NSP)
Afghanistan	9,000,000	1,336,954	Disbursed	ODA	Grant	Cross-Cutting	Material relief assistance and services / 72010	Afghanistan	CRS 2013001248 / Støtte til DACAAR
Afghanistan	50,000	7,428	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300ab / Landeprogram Afghanistan - TP 3. Vækst og Beskæftigelse
Afghanistan	37,292,531	5,539,824	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300aa / Landeprogram Afghanistan - TP 3. Vækst og Beskæftigelse
Africa, regional	600,000	89,130	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Africa, regional	CRS 2011001498ab / Støtte til forvaltningen af vand i SADC/Zambezi regionen
Africa, regional	6,399,123	950,593	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Africa, regional	CRS 2011001498aa / Støtte til forvaltningen af vand i SADC/Zambezi regionen
Africa, regional	179,998	26,739	Disbursed	ODA	Grant	Cross-Cutting	Agricultural education/training / 31181	Africa, regional	CRS 2011001526 / Afrikakommissionen. Universitets-, forsknings- og agribusiness initiativet UNIBI, (FARA)
Asia, regional	500,000	74,275	Disbursed	ODA	Grant	Cross-Cutting	Security system management and reform / 15210	Asia, regional	CRS 2014001161 / (tom)
Asia, regional	2,500,000	371,376	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Asia, regional	CRS 2015001246 / Climate Envelope 2015: IUCN - Mangroves for the Future Phase 3 (2015-18)
Bangladesh	2,842,616	422,272	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	Bangladesh	CRS 2010001680 / (tom)
Bangladesh	353,439	52,503	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Bangladesh	CRS 2010001681 / (tom)
Bangladesh	3,676,993	546,219	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221ac / Climate Change Adaptation and Mitigation Programme
Bangladesh	1,017,160	151,100	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221ad / Climate Change Adaptation and Mitigation Programme
Bangladesh	10,045,841	1,492,315	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Bangladesh	CRS 2015001187 / Climate Change Adaptation Project Phase II
Bolivia	11,286	1,676	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2010001398 / Øget værditilvækst især i små og mellemstore virksomheder, med mest fokus på forarbejdning af lan[illegible]
Bolivia	129,650	19,260	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2010001402 / Administration, rådgivning og control
Bolivia	1,662,061	246,900	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001339ab / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaændring
Bolivia	1,681,751	249,825	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001339aa / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaændring
Bolivia	17,800,527	2,644,277	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ab / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaændring
Bolivia	1,556,850	228,300	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ac / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaændring
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kenya	1,978,943	293,973	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	1,011,416	150,246	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	484,028	71,903	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	674,872	100,253	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	8,547,404	1,269,721	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	299,857	44,544	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Kenya	[illegible]
Kenya	2,797,004	415,496	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Kenya	[illegible]
Kenya	3,897,840	579,026	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Kenya	[illegible]
Kenya	3,842,597	570,820	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	34,523	5,128	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Kenya	[illegible]
Kenya	2,037,300	302,642	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	11,436,269	1,698,863	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	16,271,208	2,417,096	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	6,917,920	1,027,660	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	6,534,249	970,666	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	[illegible]
Kenya	82,711	12,287	Disbursed	ODA	Grant	Mitigation	Industrial development / 32120	Kenya	[illegible]
Kenya	249,032	36,994	Disbursed	ODA	Equity	Mitigation	Wind energy / 23240	Kenya	[illegible]
Malaysia	2,800,056	415,950	Disbursed	ODA	Equity	Mitigation	Energy policy and administrative management / 23110	Malaysia	[illegible]
Mali	15,765,960	2,342,041	Disbursed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	Mali	[illegible]
Mali	22,394,304	3,326,685	Disbursed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	Mali	[illegible]
Mali	10,949,327	1,626,528	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	[illegible]
Mali	5,007,383	743,849	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	[illegible]
Mali	37,678	5,597	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	[illegible]
Mali	866,836	128,769	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	[illegible]
Mali	30,799,217	4,575,289	Disbursed	ODA	Grant	Adaptation	Water supply and sanitation - large systems / 14020	Mali	[illegible]
Mexico	65,924	9,793	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	[illegible]
Mexico	11,076,239	1,645,381	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	[illegible]
Middle East, regional	175,021	26,000	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Middle East, regional	[illegible]
Mozambique	869	129	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Mozambique	404,896	60,148	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Mozambique	481,065	71,462	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Mozambique	2,630,240	390,723	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Mozambique	6,973,555	1,035,925	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Mozambique	658,700	97,850	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Mozambique	6,841,300	1,016,278	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	[illegible]
Myanmar	95,000	14,112	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Myanmar	[illegible]
Myanmar	365,685	54,323	Disbursed	ODA	Grant	Adaptation	Fishery development / 31320	Myanmar	[illegible]
Myanmar	1,599,875	237,662	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Myanmar	[illegible]
Myanmar	7,564	1,124	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Myanmar	[illegible]
Nepal	2,000,000	297,101	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies / 232	Nepal	[illegible]
Nepal	567,011	84,230	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	Nepal	[illegible]
Nepal	313,184	46,524	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	[illegible]
Nepal	447,794	66,520	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	[illegible]
Niger	9,520,509	1,414,276	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	[illegible]
Niger	4,055,506	602,447	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	[illegible]
Niger	469,468	69,740	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	[illegible]
Niger	2,399,525	356,451	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	[illegible]
Niger	748,995	111,264	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	[illegible]
Niger	7,000,000	1,039,853	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	[illegible]
Niger	86,746	12,886	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	[illegible]
Philippines	99,995	14,854	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Philippines	[illegible]
Serbia	426,157	63,306	Disbursed	ODA	Grant	Adaptation	Agricultural services / 31191	Serbia	[illegible]
Serbia	1,249,339	185,590	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	[illegible]
Serbia	573,786	85,236	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	[illegible]
Serbia	450,285	66,890	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	[illegible]
South Africa	4,565,169	678,158	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	South Africa	[illegible]
South Africa	459,665	68,283	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	South Africa	[illegible]
South Africa	554,062	82,306	Disbursed	ODA	Grant	Adaptation	Water sector policy and administrative management / 14010	South Africa	[illegible]
South of Sahara, regional	225,541	33,504	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	South of Sahara, regional	[illegible]
Tanzania	65,420	9,718	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	[illegible]
Tanzania	4,637,570	688,913	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Tanzania	[illegible]
Turkey	552,418	82,062	Disbursed	ODA	Grant	Mitigation	Urban development and management / 43030	Turkey	[illegible]
Uganda	763	113	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	Uganda	[illegible]
Uganda	5,522	820	Disbursed	ODA	Grant	Adaptation	Environmental education/ training / 41081	Uganda	[illegible]
Uganda	463,727	68,887	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	[illegible]
Uganda	445,951	66,246	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	[illegible]
Uganda	114,029,668	16,939,163	Disbursed	ODA	Grant	Cross-Cutting	Water supply - large systems / 14021	Uganda	[illegible]
Uganda	27,500,740	4,085,248	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	[illegible]
Uganda	1,880,272	279,315	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	[illegible]
Uganda	777,792	115,541	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	[illegible]
Uganda	10,773,801	1,600,453	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	[illegible]
Uganda	10,969,477	1,629,521	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	[illegible]
Uganda	4,295,016	638,027	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	[illegible]
Uganda	8,299,772	1,232,935	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	[illegible]
Uganda	563,903	83,768	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Uganda	[illegible]
Ukraine	250,000	37,138	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 232	Ukraine	[illegible]
Ukraine	610,151	90,638	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 232	Ukraine	[illegible]
Ukraine	88,736	13,182	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 232	Ukraine	[illegible]
Viet Nam	28,798	4,278	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Viet Nam	[illegible]
Viet Nam	948	141	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Viet Nam	[illegible]
Viet Nam	1,509,411	224,224	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	[illegible]
Viet Nam	558,963	83,034	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Viet Nam	[illegible]
Viet Nam	949,913	141,110	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	[illegible]
Viet Nam	4,525,351	672,243	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	[illegible]
Viet Nam	3,759,895	558,534	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	[illegible]
Viet Nam	579,451	86,078	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	[illegible]
Viet Nam	794,890	118,081	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	[illegible]
Viet Nam	364,254	54,110	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	[illegible]
Viet Nam	479,837	71,280	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Viet Nam	[illegible]

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[c] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities that are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.731718) 6.7317

Source: OECD

https://data.oecd.org/conversion/exchange-rates.htm

Exchange rate (USD 1 = DKK 6.731718), Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

CTF Table 8-format: Provision of technology development and transfer support.

Table 8							
Provision of technology development and transfer support [a,b]							
Recipient country and/or region	**Targeted area**	**Measures and activities related to technology transfer**	**Sector** [c]	**Source of the funding for technology transfer**	**Activities undertaken by**	**Status**	**Additional information** [d]
	Mitigation		Energy	Private	Private	Implemented	
	Adaptation		Transport	Public	Public	Planned	
	Mitigation and adaptation		Industry	Private and public	Private and public		
			Agriculture				
			Water and sanitation				
			Other				
Ethiopia, Mexico, South Africa, Vietnam, Ukraine, Turkey and Indonesia)	Mitigation	Assist countries with energy planning and transition to renewal energy	Energy	Public	Public	Implemented	NC7: Chapter 7.4.2.8 BR3: Chapter VI.4.2.8
Global/International	Mitigation and adaptation	The Climate Technology Centre and Network, CTCN (UNEP-DTU)	Other (Technology), Energy	Public	Public	Implemented	NC7: Chapter 7.4.2.5 BR3: Chapter VI.4.2.5
International and China	Mitigation	Two engagements through the International Energy Agency (IEA): i) IEA China Energy Cooperation Centre (CECC) that contribute to China's sustainable energy transition. ii) Clean Energy Ministerial Secretariat (CEM Secretariat) is facilitating exchange of best practice of clean energy policies	Other (Technology), Energy	Public	Public	Implemented	NC7: Chapter 7.4.2.8 BR3: Chapter VI.4.2.8
Kenya	Adaptation	Promotion of green technologies in Strategic Sector Cooperation with Kenya	Other (Technology)	Public	Public	Implemented	NC7: Chapter 7.4.2.7 BR3: Chapter VI.4.2.7

[a] To be reported to the extent possible.
[b] The tables should include measures and activities since the last national communication or biennial report.
[c] Parties may report sectoral disaggregation, as appropriate.
[d] Additional information may include, for example, funding for technology development and transfer provided, a short description of the measure or activity and co-financing arrangements.

CTF Table 9-format: Provision of capacity-building support.

Table 9			
Provision of capacity-building support [a]			
Recipient country/ region	**Targeted area**	**Programme or project title**	**Description of programme or project [b,c]**
	Mitigation Adaptation Technology development and transfer Multiple areas		
Bangladesh	Adaptation	Climate Change Adaptation Project	Denmark has 2013 to 2016 supported Bangladesh with a Climate Change Adaptation Project that has with a participatory approach was focused on adaptation of rural infrastructure to climate change. Including upgrading, constructing and maintaining of climate resilient and sustainable rural roads.
Bolivia	Adaptation and Mitigation	Promotion of Sustainable Natural Resource Management & Climate Change (Bolivia Country Programme - part III)	The programme is with 236 mio. DKK (2014-2018) supporting supported: i) Improved forest management and livelihood in national parks and forestry areas, ii) Improved energy efficiency, use of renewable energy and cleaner technologies and iii) Climate change mitigation and adaptation (indicators will be based on monitoring system that will be developed during 2013/14, including reduces rate of deforestation and emissions compared to a base scenario, adaptation of production and management methods related to forest management.
Ethiopia	Adaptation	Greening of Agricultural Transformation in Ethiopia (GATE) thematic programme	The thematic programme is designed to i) accelerate a green" transformation of the agricultural sector with a focus on the Ethiopian small-holder farmers and ii) gather speed to the mainstreaming and implementation of Ethiopian climate resilient green economy initiatives within agriculture and forestry.
Global	Mitigation	Program to support sustainable energy systems via Fossil Fuel Subsidy Reform	Denmark is among 15 donors supporting ESMAP, which is a World Bank technical assistance and knowledge programme providing advisory and analytical services to low- and middle income countries to increase their capacity to achieve sustainable energy solutions for poverty reduction and low carbon development.
Global	Adaptation	Least Developed Countries Fund	LDCF has funded developments of NAPAs, and at this stage all LDCs have an approved NAPA in place. Almost all countries which have produced an approved NAPA have at least one LDCF project. In total, 138 projects have been endorsed (by May 2016), where 67% of the financing goes to Africa and Asia and Pacific receives 30% of the finance. This largely reflects the geographical distribution of the LDCs.
Ethiopia, Mexico, South Afric	Mitigation	Assist countries with energy planning and transition to renewal energy	The Danish Energy Agency cooperates with the governments of several emerging economies with focus on policy improvements in long term energy planning and modelling, renewable energy integration and deployment, energy efficiency interventions and in climate change mitigation.
Kenya	Mitigation	Promotion of green technologies in Strategic Sector Cooperation	The project is designed to strengthen the capacity of Kenyan partners to mitigate uncontrolled emissions of untreated solid waste and waste water affecting health and the quality of the livelihood of Kenyan citizens in a context of circular economy.
South of Sahara, regional	Mitigation	Enhancing the capacity of the organic movements in East Africa, ECOMEA	A regional market in the East African Community for organic products that will contribute to; poverty alleviation and income generation for small holder farmers in the region; improved nutritional status for consumers; mitigation of climate changes; is developed. Trade facilitation project in collaboration with Organic Denmark.
Mozambique	Multiple Areas	Adaptation and building climate change resilience in	Programme supporting programmes for adaptation and building climate change resilience (between 2011 and 2016) in collaboration with central government, municipalities, and civil society organisations.

[a] To be reported to the extent possible.

[b] Each Party included in Annex II to the Convention shall provide information, to the extent possible, on how it has provided capacity-building support that responds to the existing and emerging capacity-building needs identified by Parties not included in Annex I to the Convention in the areas of mitigation, adaptation and technology development and transfer.

[c] Additional information may be provided on, for example, the measure or activity and co-financing arrangements.

Annex D2 Description of selected programmes/projects to advance and/or finance transfer of technologies to other countries

Description of selected projects or programmes to advance and/or finance transfer of technologies to developing countries:

Project/programme title: Energy partnership programme			
Purpose: Supporting energy sector transformation			
Recipient country	**Sector**	**Total funding**	**Years in operation**
Multi-country	Renewable Energy and Energy efficiency	More than 300 million DKK (not including related private investments)	Since 2008

Description: The Danish Energy Agency cooperates with the governments of a number of developing countries on capacity building and technology transfer related to sector energy transition to become a low-carbon economy. The cooperation is primarily focusing on policy improvements in long term energy planning and modeling, renewable energy integration and deployment, energy efficiency interventions and in climate change mitigation, and preparation of specific investments in renewable energy projects and technology transfer.

- Denmark and Ethiopia cooperates on expanding Ethiopian wind power. The Danish Energy Agency is among the Danish authorities who contribute Ethiopia's ability to utilise its huge wind potential, providing technical assistance and experiences from Denmark as well best practice internationally.
- China and Denmark cooperates on transition to a low-carbon economy that proved it possible to reduce emissions and maintaining economic growth.
- Support is provided to Mexico for implementing its climate change strategy and action plans, helping to improve Mexico's frameworks for introducing renewable energy and energy efficiency interventions.
- Assistance is provied to South Africa for transforming its energy sector away from coal. The focus is on mitigating carbon emissions, increasing energy efficiency and improving conditions for renewable energy into the country's energy mix.
- Denmark is supporting Vietnam in order to improve the Vietnamese energy efficiency and increase use of renewable energy, and investing in low emission technologies in SMEs.
- In 2015 the Ukrainian-Danish Energy Centre opened in Kiev. Here Denmark supports the Ukrainian authorities in building capacity for the implementation of Ukraine's long term energy strategy and planning.
- The Danish Energy Agency is supporting Turkey in meeting its long-term objectives for renewable energy, energy efficiency and district heating. It is also assisting with the research and innovation agendas related to these sectors.
- Indonesia with a programme focusing on energy planning, integrating renewable energy into the energy mix and increasing energy efficiency.

In the period 2012-2016 the cooperation was carried out through the Low Carbon Transition Unit (LCTU) based at the Danish Energy Agency under the Ministry of Climate, Energy and Building. In 2017, the LCTU was replaced by the Danish Energy Agency's Energy Partnership Programme (DEPP).

The DEPP consists of experts within the fields of energy efficiency, renewable energy, mitigation analysis as well as international greenhouse gas emission baselines. The DEPP gives high quality technical government-to-government guidance to help developing countries and emerging economies with greenhouse gas emission reductions and low carbon transition in the energy sector. The DEPP works both with countries regarding general and methodological issues relevant to greenhouse gas emission reductions as well as with specific energy-related capacity building and technology transfer in selected emerging economies as described above.

Annex D3 contains further information about the DEPP.

Factors leading to success: partnership built around authority-to-authority cooperation but involving multipliable partners from public and private sector from both Denmark and partner countries.

Technology transferred: Both soft and hard technologies related to energy sector transformation, introduction of renewable energy in energy mix , grid integration, energy efficiency in building and industrial processes, etc.

Impact on greenhouse gasses emissions/sinks (optional): depend on specific countries and contexts, many measures related to introducing energy management technologies required for energy sector transformation

Project/programme title: Energy Efficiency in industry, Bangladesh			
Purpose: supporting energy audits and implementation of EE measures in industry			
Recipient country	Sector	Total funding	Years in operation
Bangladesh	Energy efficiency in industry	DKK 5 million	2014-2017
Description: Through the Nordic Chamber of Commerce and Industry Denmark has supported piloting of energy efficiency audits and implementation of energy efficiency measures and technologies in a number of private sector companies in various sectors. The project has built capacity among private energy auditors and strengthened the local market for their services. Further, it has supported capacity building and training of energy managers and piloting of the introduction of energy saving technologies and processes in more than 50 companies. For addtional info see web-site. http://3e.nccib.com/			
Indicate factors which led to the project's success: working through the network NCCI was an entry-point to in particular the garment industry. Industry open to voluntary initiative from one of its own organisations.			
Technology transferred: various energy saving processes and technologies, mainly in the garment industry			
Impact on greenhouse gasses emissions/sinks (optional): information on specific savings available from web-site.			

Project/programme title: Programme for sustainable energy in rural areas in Nepal (following Energy Sector Assistance Programme phase 1 & 2)			
Purpose: Sustainable development for rural population in Nepal through support to technologies within sustainable energy.			
Recipient country	Sector	Total funding	Years in operation
Nepal	Energy	2012: DKK 205 million. Phase 1 & 2: DKK 341 million	2012-2017 (1999-2017)
Description: Programme for sustainable energy in rural areas of Nepal will build of the success of Energy Sector Assistance Programme phase 1 & 2 and is expected to reach 1,4 million people in rural Nepal. 150,000 households will become connected to the local electricity grid. 600,000 household will get solar cell energy and 130,000 households will get biogas from gasifiers.			
Indicate factors which led to the project's success: ESAP II has achieved impressive results in terms of providing rural households with access to renewable energy and energy efficient (RE&EE) technologies. By December 2010, ESAP II has assisted the instalment of 191,000 improved cooking stoves (ICS), 157,000 solar home systems (SHS), 9,000 SSHS, and provided 63,000 households with access to electricity from mini-grids (includes households from MHP-projects presently under construction). This presents a higher level of annual installations than during ESAP I. ESAP II contributed to the formulation of Government of Nepal (GoN) policies for rural and renewable energy, including the national subsidy policy for RE and to getting RE incorporated in the Government's three-year development plans. ESAP II's pilot activities to promote credit finance of SHS and of MHP-projects by commercial banks have resulted in commercial credit finance of 3,000 SHS and 5 MHP-projects; the rational approach, which was developed and applied in the pilots, will yield an important expansion of commercial credits to RE in a few years.			
Technology transferred: Renewable energy and energy efficient (RE&EE) technologies.			
Impact on greenhouse gasses emissions/sinks (optional): Reduced emission as result of introducing sustainable energy.			

Annex D3 Information on the Danish Energy Agency Energy Partnership Programme - DEPP

To address the global challenge of climate change, the Danish Climate Envelope was established in 2008 to support climate change mitigation and adaptation activities in developing countries. The Climate Envelope has since 2012 financed energy and climate related programs in Mexico, Viet Nam and South Africa. In addition, the Danish Energy Agency (DEA) has provided technical assistance to these three countries and China. Based on Denmark's development priorities and achievements from previous engagements Denmark allocated DKK 115 million from the Climate Envelope 2017 to continue the cooperation with the four countries through a 3-year programme starting Mid-2017 – the Danish Energy Agency Energy Partnership Programme (DEPP).

The intention is to assist the four countries with their transition to a low carbon economy and support them in implementation of the Paris agreement. Expertise and experience derived from Denmark's transitioning away from a fossil fuel economy form the backbone of the programme and is activated in a Government-to-Government cooperation between the DEA and the partnership institutions.

As an integral part, international Long-Term Advisors are posted with the key-partnership institutions. This is combined with advisory support from DEA specialists experienced with Danish and international energy sector public planning and regulation. Through DEA, the partner institutions furthermore have networking opportunities to access other Danish institutions and expertise including through delegation visits, study tours and internships. Cross-fertilisation, sharing of lessons learned between the four partnership programmes and south-south dialogue opportunities and needs are pursued and facilitated by DEA as well as synergies with and coordination within multilateral initiatives and fora where Denmark participates.

By supporting enabling framework conditions, the development of larger renewable energy and energy efficiency markets is anticipated in the four partner countries, and could hence benefit Danish private sector companies who specialize in green energy solutions. Danish companies will have frequent opportunities to engage with relevant stakeholders in partner countries to showcase green solutions and products. Danish representations in partner countries will engage in dialogue with Danish private sector companies in order to assess market barriers and feed this information into the ongoing activities of the programme. At the same time, the private sector will be informed of developments in the sector that may be of commercial interest.

At the overall level, the programme provides technical assistance to build capacity with partnership programme participants i) to provide convincing input for governmental energy, climate/low carbon policies, strategies and plans and ii) to deal with implementation aspects of energy efficiency and of high shares of variable energy in the national power systems in a cost-efficient manner.

Mexico

The development objective is that Mexico is in transition to decouple carbon emissions from economic growth through cost-efficient mitigation actions. This is supported through three Development Engagements:

1) Efficient integration of additional renewable energy in the power sector
2) Increase efficiency in the use of energy
3) Support to climate change mitigation measures

The programme assists the Ministry of Energy (Mexico) in developing more comprehensive energy planning capabilities that encompass the efficient deployment and integration of renewable energy technologies and paves the way for a potential larger role of biomass in the power supply mix. Furthermore, CENACE (National Centre for Control of Energy, Mexico) is assisted to integrate a larger share of renewable energy into the electricity grid by (i) developing best practices on transmission grid planning, including technical grid analysis, cost/benefit analysis and investment criteria, and (ii) increase reliability and efficiency in the operation of the electricity system, including enhanced forecasting of renewable energy generation.

The programme furthermore assists the National Commission for Energy Efficiency in: developing and setting-up a long term scheme targeting industrial energy efficiency, and in implementation of a test incentive scheme financed by Mexican resources and based on voluntary agreements with high energy intensity industries; engaging states and municipalities in applying and enforcing energy efficiency standards in buildings; and in end-use data acquisition and modelling so that it can suitably inform the political choices in the country.

Finally, the programme assists the Ministry of Environment and Natural Resources (Mexico) and underlying institutions with identification and initiation of additional national and sub-national measures to reach un-conditional climate target including most cost-efficient pathway to achieve conditional targets in line with the NDC targets.

South Africa
The development objective is that South Africa is in transition to a less carbon-intensive electricity production including through expansion of renewable energy generation. This is supported through two Development Engagements:

1) Capacity Development for Energy Sector Planning
2) Renewable Energy Integration into the National Power System of South Africa

The programme assists the Department of Energy (South Africa) to develop more comprehensive energy planning capabilities including through consolidation of data, forecasts, peer reviewed assumptions and additional long term policy and policy implementation scenarios for a less-carbon intensive electricity sector. Outputs will be subjected to dialogues with government stakeholders, academia, civil society, private sectors investors and other relevant stakeholders. The programme furthermore assists ESKOM with knowledge and expertise to operate the power system with a higher degree of flexibility and cost-efficiency, and providing tools and methodologies to do accurate renewable energy generation forecasting.

China
The objective is that China is in transition to a less carbon-intensive energy sector including through increased share of renewable energy and sustainable district heating. This is supported through two Development Engagements:

1) Transformation of the Chinese Energy System.
2) Energy Efficiency with National Energy Conservation Centre.

The programme assists China Renewable Energy Centre to develop convincing renewable energy policy and planning input for Chinese policy makers showing clear pathways for setting more ambitious renewable energy targets in the 14th Five-Year-Plan. This entails: ambitious renewable long-term scenarios for China published in the China Renewable Energy Outlook; analysis on thermal power flexibility including suitable incentive systems for thermal plants and technological and management solutions to increase flexibility and; grid development strategies working with Chinese grid companies.

Furthermore, the programme assists the National Energy Conservation Centre (China) to develop a more efficient planning- and implementation framework for sustainable district heating. It will strengthen the capacity of the centre in generating convincing policy and planning input for sustainable district heating and in influencing local level planning frameworks to consider sustainable alternatives for investment decisions.

Viet Nam
The objective is that most cost-effective opportunities for low carbon transition in energy system are more widely adopted throughout Viet Nam. This will be supported through three Development Engagements:

1) Capacity Development for long-range energy sector planning
2) Capacity Development for Renewable Energy Integration into the Power System
3) Low carbon development in the industrial sector

The programme assists the Viet Nam Ministry of Industry and Trade to commission, develop, and analyze comprehensive long-term energy scenarios including through capacity building and supporting consultations among stakeholders and decision makers on the future development paths of the energy sector based upon comprehensive cost-optimized scenario analyses.

Furthermore, the Electricity Regulatory Authority of Viet Nam is assisted to build capacity with power system participants for them to develop and implement supportive measures for engaging auxiliary services and for them to do more accurate forecasting.

Finally, the Ministry of Industry and Trade is assisted in strengthening the implementation framework for provincial level to target the most cost beneficial opportunities for low carbon development in industry and a more coherent and consistent national level regulatory framework contributing to industrial low carbon policy.

Annex E Denmark's report on systematic climate observations for the global climate observing system (GCOS)

DENMARK'S REPORT ON SYSTEMATIC OBSERVATIONS FOR THE GLOBAL CLIMATE OBSERVING SYSTEM (GCOS) IN CONNECTION WITH THE SIXTH NATIONAL COMMUNICATION UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC)

from

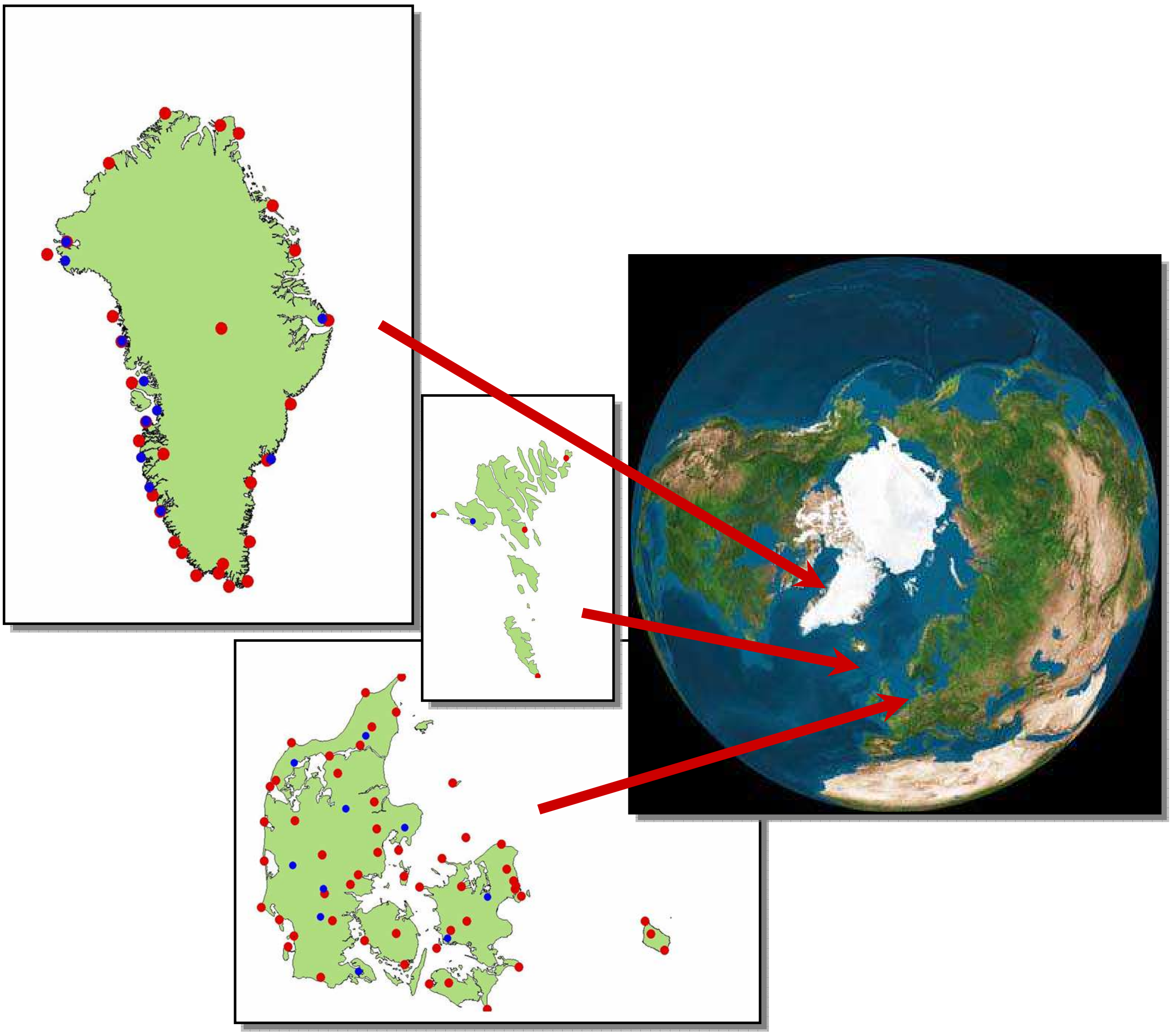
National Report on Global Climate Observing Systems (GCOS) in Denmark, Greenland and the Faroe Islands 2017

Status report on national GCOS activities

Compiled by Claus Kern-Hansen, Danish Meteorological Institute (DMI)

Danish Climate Centre Report 17-23

2017



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Disclaimer

The information in this report represents the best knowledge available to the compiling editor by the time of issue.

Content **Page**

Introduction

This status report has been prepared to give an update on the Danish contribution to the systematic climate observations in the Global Climate Observing System (GCOS) as of 1th of January 2017.

The present report is an update of the first report based on the reporting guidelines contained in decision 11/CP.13, by the United Nations Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA) focussing on Essential Climate Variables. The report was first issued in 2008 titled "National Report on Global Climate Observing Systems (GCOS) in Denmark, Greenland and the Faroe Islands 2008" and later updates and reprinted in 2013 in the DMI report series "Danish Climate Centre Report" as nr 11-04 and 13-05.

The purpose of this report is to provide an overview of the national Global Climate Observing Systems (GCOS) for the use of the Secretariat of CGOS for its detailed progress report on the Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC.

1 Common Issues

1.1 National coordination

Climate research and the generation of climate-related observations are carried out by various government departments in order for them to meet their responsibilities.

Currently, no national plan exists for the whole area of climate research and observations.

In its capacity as National Meteorological Service, The Danish Meteorological Institute (DMI) represents Denmark at World Meteorological Organization (WMO), and therefore currently undertakes the role as national focal point/coordinator for GCOS (NFP-GCOS), with the Terms of Reference to undertake GSN and GUAN issues related to data availability, exchange and quality.

Currently, no national GCOS secretariat has been established in Denmark.

1.2 Efforts undertaken to ensure high-quality climate data records.

A number of agencies in Denmark engage in the systematic observation of elements of the climate system. Invariably the capture, quality control and archiving of such data are designed to meet the integrated needs of these agencies, deriving from their overall missions.

Typically the drivers for long-term systematic observation of environmental or ecological characteristics arise from an operational, regulatory or research need. Examples of the former are to be found in the capture of meteorological data for predictive and statistical services by the Danish Meteorological Institute (DMI). The resulting observation programmes tend to be long term, but the resulting individual data may be seen as perishable and focus might not always be on maintaining stability and reliability in the records. The general need for systematic and reliable time series is increasingly being understood in the scientific community and incorporated in the collection and data processing procedure.

In this report relevant climate observations for Denmark, Greenland and the Faroe Islands will be described.

1.3 Efforts undertaken to ensure the data exchange and availability

In general the data are available from the institutions operating the observing station / collecting the data, but many can also be found on the web, for instance www.dmi.dk.

Where data such as contributions to GCOS are submitted to the appropriate data centres, they are also available from these centres.

Additionally, all meteorological data and products that are produced by WMO Members (national meteorological services) to the WMO programmes such as the WWW are available under the terms of WMO Resolution 40 (WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities).

Such data are freely available without charge (i.e. at no other cost than the cost of reproduction and delivery, without charge for the data and products themselves and with no condition on their use)

Similarly hydrological data and products are covered under WMO Resolution 25.

2 Atmospheric Essential Climate Variables (ECV)

2.1 General information

Denmark participates fully in the GCOS Surface Network (GSN) and the GCOS Upper Air Network (GUAN), and in the Global Ozone Observing System (GO3OS) as part of the Global Atmospheric Watch (GAW).

2.2 Contributions to the GCOS Networks from International relevant stations

2.2.1 Contributions to the GCOS Surface Network (GSN)

The seven designated GSN stations in Denmark, Greenland and on the Faroe Islands are all run by DMI and include (Numbers are WMO station numbers):

Greenland:	4211 Upernarvik, 4250 Nuuk, 4320 Danmarkshavn
	4360 Tasiilaq, 4390 Prins Christian Sund;
The Faroe Islands;	6011 Tórshavn
Denmark:	6186 Copenhagen.

All of these stations currently meet the required standard for surface observation.

2.2.2 Contributions to the GCOS Upper Air Network (GUAN)

Only one GUAN station is designated for Denmark, Greenland and the Faroe Islands:

WMO nr. 4270 Narsarsuaq, Greenland.

The station is run by DMI and is operated in accordance with the required standard.

2.2.3 Contributions to the Global Atmosphere Watch (GAW)

As part of the GAW programme, Denmark contributes to the Global Ozone Observing System (GO3OS) with two stations in Greenland and one in Denmark.

The stations in Greenland are: Kangerlussuaq and Illoqqortoormiut.
The station in Denmark is located in Copenhagen.

The stations in Greenland are Arctic stations in the Network for the Detection of Atmospheric Composition Change (NDACC) that is supported by the International Ozone Commission.

TABLE 1A. NATIONAL CONTRIBUTIONS TO THE SURFACE-BASED ATMOSPHERIC ESSENTIAL CLIMATE VARIABLES

Contributing networks specified in the GCOS implementation plan	ECVs[a]	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2015	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
GCOS Surface Network (GSN)	Air temperature	7	7	7	7	7
	Precipitation	7	7	7	7	7
Full World Weather Watch/Global Observing System (WWW/GOS) surface network (RBSN stations)	Air temperature, air pressure, wind speed and direction, water vapour	37	37	37	37	37
	Precipitation	15	15	15	15	Not known
Baseline Surface Radiation Network (BSRN)	Surface radiation	0	0	0	0	0
Solar radiation and radiation balance data (RBSN stations)	Surface radiation	7	7	7	7	Not known
Ocean drifting buoys	Air temperature, air pressure	0 **(note1)**	0 **(note1)**	0 **(note1)**	0 **(note1)**	0 **(note1)**
Moored buoys	Air temperature, air pressure	0	0	0	0	0
Voluntary Observing Ship Climate Project (VOSClim)	Air temperature, air pressure, wind speed and direction, water vapour	0	0	0	0	0
Ocean Reference Mooring Network and sites on small isolated islands	Air temperature, wind speed and direction, air pressure	0	0	0	0	0
	Precipitation	0	0	0	0	0

Note 1: Denmark (DMI) participates in the EUMETNET programme SURFMAR, which operates approximately 80 drifting buoys.

Table 1b. National contributions to the upper-air atmospheric essential climate variables

Contributing networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2015	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
GCOS Upper Air Network (GUAN)	Upper-air temperature, upper-air wind speed and direction, upper-air water vapour	1	1	1	1	1
Full WWW/GOS Upper Air Network	Upper-air temperature, upper-air wind speed and direction, upper-air water vapour	5	5	5	5	5

TABLE 1C. NATIONAL CONTRIBUTIONS TO THE ATMOSPHERIC COMPOSITION

Contributing networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2015	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
World Meteorological Organization/ Global Atmosphere Watch (WMO/GAW) Global Atmospheric CO_2 & CH_4 Monitoring Network	Carbon dioxide	0	0	0	0	0
	Methane	0	0	0	0	0
	Other greenhouse gases	0	0	0	0	0
WMO/GAW ozone sonde network[a]	Ozone	1	1	1	1	1
WMO/GAW column ozone network[b]	Ozone	3	3	3	3	3
WMO/GAW Aerosol Network[c]	Aerosol optical depth	3	3	3	3	3
	Other aerosol properties	0	0	0	0	0

2.3 SATELLITE OBSERVATIONS AS BASE FOR ATMOSPHERE RELATED ECV OBSERVATIONS

Denmark is member state in EUMETSAT and ESA.

Especially through EUMETSAT Denmark takes functional part in activities related to the utilization of satellite data in analyses related to ECVs and climate monitoring.

The table below is indicating **in blue** areas where the Danish participation is more significant.

TABLE 2. GLOBAL PRODUCTS REQUIRING SATELLITE OBSERVATIONS – ATMOSPHERIC ESSENTIAL CLIMATE VARIABLES

ECVs/ Global products requiring satellite observations	Fundamental climate data records required for product generation (from past, current and future missions)
Surface wind speed and direction Surface vector winds analyses, particularly from reanalysis	Passive microwave radiances and scatterometry
Upper-air temperature Homogenized upper-air temperature analyses: extended MSU-equivalent temperature record, new record for upper-troposphere and lower-stratosphere temperature using data from radio occultation, temperature analyses obtained from reanalyses **EUMETSAT ROM-SAF/CM-SAF**	Passive microwave radiances, GPS radio occultation, high-spectral resolution IR radiances for use in reanalysis
Water vapour Total column water vapour over the ocean and over land, tropospheric and lower stratospheric profiles of water vapour **EUMETSAT ROM-SAF/CM-SAF**	Passive microwave radiances, GPS radio occultations, UV/VIS radiances, IR imagery and soundings in the 6.7um band, microwave soundings in the 183 GHz band
Cloud properties Cloud radiative properties (initially key ISCCP products)	VIS/IR imagery, IR and microwave soundings
Precipitation Improved estimates of precipitation, both as derived from specific satellite instruments and as provided by composite products	Passive microwave radiances, high-frequency geostationary IR measurements, active radar (for calibration)
Earth radiation budget Top-of-atmosphere Earth radiation budget on a continuous basis	Broadband radiances, spectrally-resolved solar irradiances, geostationary multi spectral imagery
Ozone Profiles and total column of ozone, global UV indices **EUMETSAT O3M-SAF**	UV/VIS and IR microwave radiances
Aerosol properties Aerosol optical depth and other aerosol properties	VIS/NIR/SWIR radiances
Carbon dioxide, methane and other long-lived greenhouse gases Distribution of greenhouse gases, such as CO_2 and CH_4, of sufficient quality to estimate regional sources and sinks	NIR/IR radiances
Upper-air wind Upper-air wind analyses, particularly from reanalysis	VIS/IR imagery, Doppler wind lidar
Atmospheric reanalyses	Key FCDRs and products identified in this report, and other data of value to the analyses

2.4 OTHER NETWORKS FOR MONITORING WEATHER AND ATMOSPHERIC COMPOSITION.

2.4.1 Climatological/meteorological surface stations

DMI operates and receives data from a network of approximately 100 automatic meteorological stations in Denmark, Greenland and on the Faroe Islands. Measurements are made in accordance with the WMO recommendations.

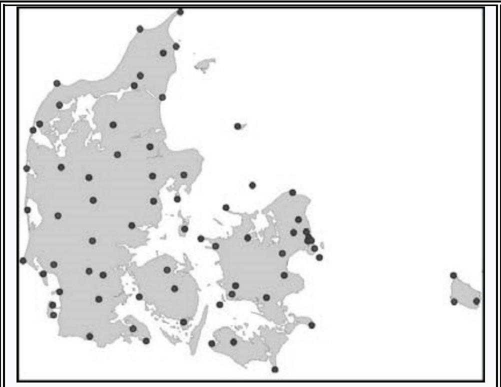


Fig. 1 – DMIs network of weather stations in Denmark

Fig. 2 – DMIs network of weather stations in Greenland

Fig. 3– DMIs network of weather stations on the Faroe Islands

As of 2001 a special dedicated network of (manual) stations for climatological observations has been discontinued, due to the convergence between the different network technologies. The objectives behind this decision are to eliminate human errors, to benefit from potential savings due to this rationalisation, and to reach a higher observation frequency. Climatological data are now obtained from the automatic network described above.

Climatological data are collected to define the climate in Denmark, Greenland and on the Faroe Islands and to create a national database for a wide range of enquiries and research activities. Climatological work mostly consists of preparing annual and monthly statistics, including calculation of averages, percentiles and standard deviations.

Substantial recorded data are needed to establish reliable averages and trends. The daily inflow of data from Denmark, Greenland and the Faroe Islands is around 100,000 observations, and the central database at DMI currently contains more than 300,000,000 observations. Some of the recorded data are from as early as 1872.

A monthly summary is prepared for the three stations in Denmark, one on the Faroe Islands and eight in Greenland using the CLIMAT format. These data are routinely submitted via the GTS.

2.4.2 Precipitation observation networks (stations and radar)

For national purposes, more data concerning precipitation is needed than can be provided from the overall surface climatological and meteorological network described above. In Denmark the precipitation observation network consists of approximately 250 stations, all automatic. Half of this network is jointly operated by DMI and The Water Pollution Committee of the Society of Danish Engineers (Spildevandskomitéen - SVK), the other half is owned and operated by DMI.

Information on precipitation can also be obtained from weather radar data. In Denmark, DMI runs a network of five weather radars which provides 100% coverage of Danish land areas and coastal marine areas. The network's geographical coverage is unsurpassed, and hence provides detailed information about precipitation on national and local scales. By calibrating radar data against point measurements of precipitation the latest scientific results show a high absolute accuracy.

During wintertime, a network of 75 manual snow depth stations is operated in Denmark, reporting once a day.

In Greenland and the Faroe Islands, precipitation is primary measured at the automatic weather stations.

2.4.3 Surface radiation observation networks

Radiation is measured as 10- minute mean values of global radiation at the DMI operated weather station.

2.4.4 Solar ultraviolet (UV) radiation and stratospheric ozone stations

Solar Ultraviolet (UV) radiation at different wavelengths is measured by DMI at one station in Greenland, Kangerlussuaq. In addition, DMI performs daily measurements of total ozone at Copenhagen, Kangerlussuaq, and weekly ozone soundings at Illoqqortoormiut.

DMI provides near real time global UV-indices as part of the EUMETSAT O3M-SAF.

2.4.5 Upper air strata measurements – Radio sounding observations

DMI runs radio sounding stations at the following six locations: Tórshavn (the Faroe Islands), Dan-markshavn, Illoqqortoormiit, Tasiilaq, Narsarsuaq and Aasiaat (Greenland). Two soundings are made every day at these stations.

2.4.6 Ice observations

DMI is responsible for the systematic surveillance of sea ice conditions in the Greenland waters. Observations concerning ice conditions have been collected for approximately 140 years and an extensive volume of data is available in a graphic format as monthly summaries, ice maps etc.

Since 1959 special emphasis has been on the waters south of Cape Farewell (the southern tip of Green-land) in order to improve navigation safety in what is an important navigation area. Ice maps containing detailed information on the relevant ice conditions are prepared several times a week. The most recent maps are available in vector graphic format.

Since 1999 weekly summaries of the ice conditions for all Greenland waters have been prepared. These summaries, which are based on satellite data, are generated semi-automatically and are primarily intended for climatological analyses as the energy radiation from the sea is highly dependent on whether it is covered with ice or not.

2.4.7 Climatological data sets

Over the years, DMI has established a number of very long climatological series with differing periods of information representing Denmark, Greenland and the Faroe Islands.

The long daily time series include: precipitation, temperature, atmospheric pressure and cloud cover for a number of Danish locations as well as precipitation and temperatures for two Greenland Stations 1874-2016

The long monthly time series include: temperatures, precipitation, atmospheric pressure, cloud cover and snow for stations in Denmark, Greenland and on the Faroe Islands

The long annual time series include: temperature for a number of stations in Denmark, Greenland and on the Faroe Islands (1873-2016), as well as temperatures, precipitation, hours of sunshine and cloud cover given as national averages for Denmark

All the above mentioned datasets are freely available through the annual updates of DMI Reports at www.dmi.dk

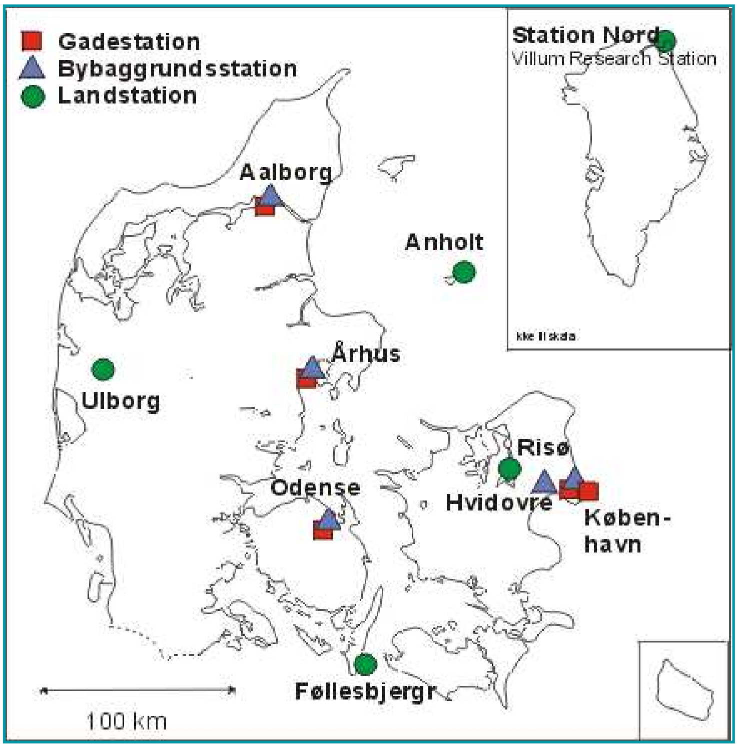
2.4.8 Air quality monitoring

Air pollution is automatically monitored in both urban and rural areas across Denmark and at one station in Greenland. This monitoring network is operated by Department of Environmental Sciences at Aarhus University (The Danish Centre for Environment and Energy (DCE 2011 replaced the former National Environmental Research Institute (NERI) and measures a wide range of pollutants:

- Nitrogen monoxide (NO)
- Nitrogen dioxides (NO_2)
- Ozone (O_3)
- Sulphur dioxide (SO_2)
- Total Suspended Particulate matter, TSP (PM_{10})
- The chemical composition of particles (sulphate, sea salt, heavy metals etc.)
- Nitrogen compounds (ammonia (gas), particulate ammonium, sum of nitric acid and particulate nitrate)
- Carbon monoxide (CO)

Figure 4 shows the types and distribution of air quality monitoring stations across Denmark and in Greenland.

FIGURE 4 – NATIONAL NETWORK OF AIR QUALITY MONITORING STATIONS IN DENMARK OPERATED BY DEPARTMENT OF ENVIRONMENTAL SCIENCES AT AARHUS UNIVERSITY



■: urban network

●: background network: △urban and background network

http://www2.dmu.dk/1_Viden/2_miljoe-tilstand/3_luft/4_maalinger/5_maaleprogrammer/oversigtskort.asp

3 Oceanic essential climate variables (Oceanic ECV)

3.1 NATIONAL CONTRIBUTION TO OCEANOGRAPHIC ECV

Oceanographic observations for GCOS are based on the GOOS climate module for the open ocean, which comprises the following programmes: drifting and moored buoy programmes managed by the DBCP (Data Buoy Co-operation Panel), the Ship of Opportunity Programme (SOOP), the Argo array of profiling floats, the Global Sea Level Observing System (GLOSS), the Voluntary Observing Ships Programme (VOS) and the Automated Shipboard Aerological Programme (ASAP).

Denmark participates in the ASAP programmes as described in paragraph 3.2.

TABLE 3A. NATIONAL CONTRIBUTIONS TO THE OCEANIC ESSENTIAL CLIMATE VARIABLES – SURFACE

Contributing Networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2015	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
Global surface drifting buoy array on 5x5 degree resolution	Sea surface temperature, sea level pressure, position-change based current	0 **(note 2)**	0 **(note 2)**	0 **(note 2)**	0 **(note 2)**	0 **(note 2)**
GLOSS Core Sea-level Network	Sea level	0	0	0	0	0
Voluntary observing ships (VOS)	All feasible surface ECVs	0 **(note 2)**	0 **(note 2)**	0 **(note 2)**	0 **(note 2)**	0 **(note 2)**
Ship of Opportunity Programme	All feasible surface ECVs	0	0	0	0	0

Note 2: Denmark (DMI) participates in the EUMETNET programme SURFMAR, which operates approximately 80 drifting buoys and 10 voluntary observing ships (VOS) of which DMI maintains 4.

TABLE 3B. NATIONAL CONTRIBUTIONS TO THE OCEANIC ESSENTIAL CLIMATE VARIABLES – WATER COLUMN

Contributing Networks specified in the GCOS implementation plan	ECVs	Number of stations or platforms currently operating	Number of stations or platforms operating in accordance with the GCMPs	Number of stations or platforms expected to be operating in 2015	Number of stations or platforms providing data to the international data centres	Number of stations or platforms with complete historical record available in international data centres
Global reference mooring network	All feasible surface and subsurface ECVs	0	0	0	0	0
Global tropical moored buoy network	All feasible surface and subsurface ECVs	0	0	0	0	0
Argo network	Temperature, salinity, current	0	0	0	0	0
Carbon inventory survey lines	Temperature, salinity, ocean tracers, biogeo-chemistry variables	0	0	0	0	0

3.2 Automated Shipboard Aerological Programme (ASAP).

The E-ASAP (Eucos ASAP) in its present form began in the mid1980s.

The programme's objective is to record profile data from the upper air strata in ocean areas using automated sounding systems carried on board merchant ships plying regular ocean routes.

Several national meteorological services operate ASAP units and the collected data are made available in real time via GTS.

ASAP data are archived alongside other radio sounding data by many national meteorological services. ASAP is an important contribution to both the WWW and GCOS.

Today most of the soundings are from the North Atlantic and north-west Pacific, but the programme is expanding to other ocean basins through a new, co-operative World-wide Recurring ASAP Project (WRAP).

Denmark operates three ASAP units mounted on ships plying fixed routes from Denmark to Greenland.

3.3 Satellite observations as base for oceanic ECV observations

Denmark is member state in EUMETSAT and ESA.

Especially through EUMETSAT Denmark takes functional part in activities related to the utilization of satellite data in analyses related to ECVs and climate monitoring.

The table below is indicating **in blue** areas where the Denmark participation is more significant.

Table 4. Global products requiring satellite observations – oceans

ECVs/ Global products requiring satellite observations	**Fundamental climate data records required for product generation (from past, current and future missions)**
Sea Ice Sea ice concentration **EUMETSAT O&SI SAF**	Microwave and visible imagery
Sea Level Sea level and variability of its global mean	Altimetry
Sea Surface Temperature Sea surface temperature **EUMETSAT O&SI SAF**	Single and multi-view IR and microwave imagery
Ocean Colour Ocean colour and oceanic chlorophyll-a concentration derived from ocean colour	Multi-spectral VIS imagery
Sea State Wave height and other measures of sea state (wave direction, wavelength, time period)	Altimetry
Ocean Salinity Research towards the measurement of changes in sea surface salinity	Microwave radiances
Ocean Reanalyses Altimeter and ocean surface satellite measurements **EUMETSAT O&SI SAF**	Key FCDRs and products identified in this report, and other data of value to the analyses

3.4 ADDITIONAL NATIONAL OCEANOGRAPHIC MONITORING

3.4.1 Sea temperatures

Denmark has a network for the collection of sea temperatures at 24 coastal stations around Denmark. The stations are operated by DMI, the Danish Coastal Authority, and local authorities respectively. Data are available from each of the responsible bodies. Furthermore, sea surface temperatures are monitored using satellites, and DMI prepares daily maps for the North Sea and Baltic Sea areas.

3.4.2 National tide gauge network

In Denmark an extensive national network of tide gauges are operated jointly by DMI, local authorities and the Danish Coastal Authority. The network consists of 90 automatic stations.

In Greenland a tide gauge station is operated by DTU-Space/National Space Institute (http://www.space.dtu.dk/english).

Data are available from the responsible bodies.

3.4.3 Hydrographic and marine surveys

The Danish Centre for Environment and Energy (DCE) (former National Environmental Research Institute (NERI)), has the overall responsibility for surveillance of the Danish waters. Surveillance of fjords and coastal waters is carried out by the regional authorities, while DCE is responsible for mapping the open waters.

All of the surveys are part of the Danish nationwide monitoring programme NOVANA.

All marine NOVANA data (regional and state) are collected annually in the national marine database (MADS), by DCE.

The Danish Institute for Fisheries Research carries out yearly surveys in Danish waters, primarily in the North Sea and the Baltic Sea. Relevant oceanographic parameters are measured and recorded for these areas.

Furthermore, DMI is involved in research driven monitoring programmes.

4 Terrestrial Essential Climate Variables (ECV)

4.1 GENERAL INFORMATION

The terrestrial observation system is not as well established as the atmospheric or the oceanographic one. The reason is that most of the terrestrial observations are not part of international observation routines with a regular/daily exchange of data.

4.2 Global Terrestrial Network – Hydrology (GTN-H)

The GTN-H is a joint effort of the World Meteorological Organization / Climate and Water Department (WMO/CLW), the GCOS, and the Global Terrestrial Observing System (GTOS12), co-sponsored by WMO, UNESCO, ICSU, UNEP and FAO.

GTN-H represents the observational arm of the Group on Earth Observations / IntegratedGlobal Water Cycle Observations Theme (GEO/IGWCO).

The following hydrological variables have been identified as essential for the GTN-H13 network:

Precipitation, river discharge, groundwater, water vapour, lake level/ area, isotopic composition, soil moisture, water use, snow cover, glaciers and ice caps, evapotranspiration, water quality/ biogeochemical fluxes.

For most of the variables a global network is defined and a contact established.

The **Global Precipitation Climate Centre (GPCC)** based at German Meteorological Institute/Deutsche Wetterdienst (DWD) and operating under the auspices of the World Meteorological Organization (WMO), as well as **Global Runoff Data Centre (GRDC)**, based at the Bundesanstalt für Gewässerkunde (Federal Institute of Hydrology, BfG) in Koblenz, Germany, and operating under the auspices of the World Meteorological Organization (WMO), are both parts of the GTN-H Panel and represent their respective networks on precipitation and river discharge.

DMI contributes to GPCC with precipitation data, and DCE is reporting to GRDC under GTN-R (see paragraph 4.3).

4.3 Global Terrestrial Network for River Discharge (GTN-R)

DCE is reporting to the Global Runoff Data Centre (GRDC), based at the Bundesanstalt für Gewässerkunde (Federal Institute of Hydrology, BfG) in Koblenz, Germany, and operating under the auspices of the World Meteorological Organization (WMO).

GTN-R is a GRDC contribution to the Implementation Plan for the Global Observing System for Climate and to GTN-H.

Denmark is reporting 14 stations as shown in Table 5.

4.4 Global Terrestrial Network for Lakes (GTN-L)

As with several other data types, lake level data are recorded by both local authorities as well as at national level.

DCE is operating a database, from which national and part of local data from lakes may be available upon request.

4.5 Global Terrestrial Network on Glaciers (GTN-G)

The Geological Survey of Denmark and Greenland (GEUS), is mapping the mass-balance of the Greenlandic Icecap.

As part of these activities, a network of stations (PROMICE) is operated (http://promice.dk/about_us_uk/main.html). The PROMICE network operates 20 automatic mass balance stations in Greenland, as shown in Table 5.

4.6 Global Terrestrial Network for Permafrost (GTN-P)

Soil or rock that is permanently frozen throughout the year is called permafrost.

Permafrost is present in Greenland, and monitored at selected sites as part of (primary) individual research projects.

There is no information on any nationwide monitoring or reporting, neither nationally or internationally.

Table 5. National contributions to the terrestrial domain essential climate variables

Contributing networks specified in the GCOS implementation plan	**ECVs**	**Number of stations or platforms currently operating**	**Number of stations or platforms operating in accordance with the GCMPs**	**Number of stations or platforms expected to be opera-ting in 2015**	**Number of stations or platforms providing data to the international data centres**	**Number of stations or platforms with complete historical record available in international data centres**
GCOS baseline river discharge network (GTN-R)	River discharge	14	14	14	14	14
GCOS Baseline Lake Level/ Area/Temperature Network (GTN-L)	Lake level/area/ temperature	0	0	0	0	0
WWW/GOS synoptic network (RBSN stations)	Snow cover	3	3	3	3	Not known
GCOS glacier monitoring network (GTN-G)	Glaciers mass balance and length, also ice sheet mass balance	20	N/A	20	Data are presently available upon request	Not known
GCOS permafrost monitoring network (GTN-P)	Permafrost borehole temperatures and active layer thickness	0	0	0	0	0

4.7 Satellite observations as base for Terrestrial related ECV observations

Denmark is member state in EUMETSAT and ESA.

Especially through EUMETSAT Denmark takes functional part in activities related to the utilization of satellite data in analyses related to ECVs and climate monitoring.

At present DMI does not operate any activities in the areas shown in Table 6.

TABLE 6. GLOBAL PRODUCTS REQUIRING SATELLITE OBSERVATIONS – TERRESTRIAL

ECVs/ Global products requiring satellite observations	Fundamental climate data records required for product generation (from past, current and future missions)
Lakes Maps of lakes, lake levels, surface temperatures of lakes in the Global Terrestrial Network for Lakes	VIS/NIR imagery and radar imagery, altimetry, high-resolution IR imagery
Glaciers and ice caps Maps of the areas covered by glaciers other than ice sheets, ice sheet elevation changes for mass balance determination	High-resolution VIS/NIR/SWIR optical imagery, altimetry
Snow cover Snow areal extent	Moderate-resolution VIS/NIR/IR and passive microwave imagery
Albedo Directional hemispherical (black sky) albedo	Multispectral and broadband imagery
Land cover Moderate-resolution maps of land-cover type, high-resolution maps of land-cover type, for the detection of land-cover change	Moderate-resolution multispectral VIS/NIR imagery, high-resolution multispectral VIS/NIR imagery
fAPAR Maps of fAPAR	VIS/NIR imagery
LAI Maps of LAI	VIS/NIR imagery
Biomass Research towards global, above ground forest biomass and forest biomass change	L band/P band SAR, Laser altimetry
Fire disturbance Burnt area, supplemented by active fire maps and fire radiated power	VIS/NIR/SWIR/TIR moderate-resolution multispectral imagery
Soil moisture[a] Research towards global near-surface soil moisture map (up to 10 cm soil depth)	Active and passive microwave

5 Additional information

5.1 Detailed reporting

Denmark provided a detailed report as part of "Denmark's Fifth National Communication on Climate Change under the United Nations Framework Convention on Climate Change and the Kyoto Protocol" to the UNFCCC in 2009.

5.2 WMO RA VI Pilot Regional Climate Centres Network (RCC-Network) and European Climate Assessment & Dataset (ECA&D)

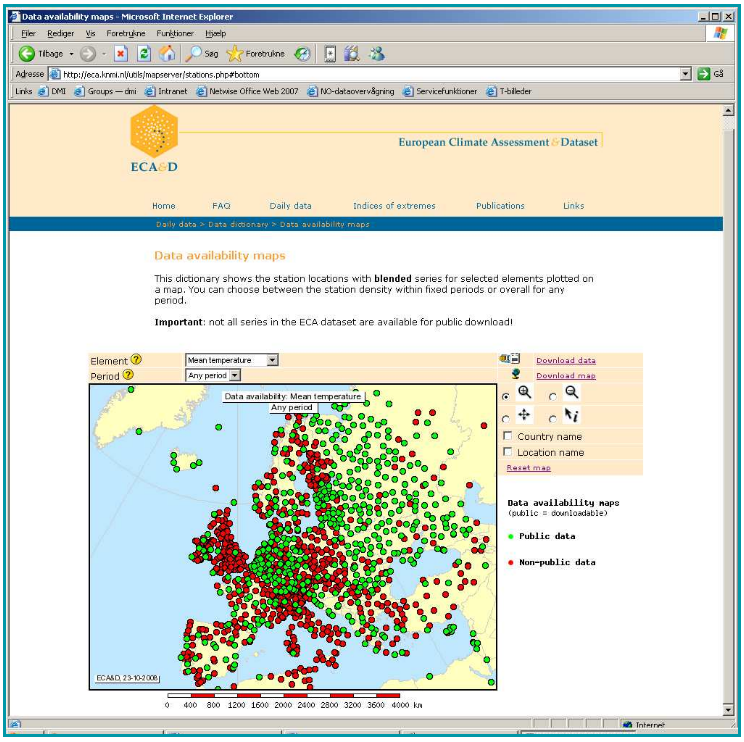
Through DMI's active participation in the EUMETNET Expert Team Climate (former EUMETNET programme ECSN (European Climate Support Network)) Denmark contributes very actively to the European Climate Assessment & Dataset (ECA&D) http://eca.knmi.nl/ – at present the most comprehensive climate dataset and analysis for Europe.

ECA&D forms the backbone of the climate data node in the Regional Climate Centre (RCC) ["The Regional Climate Centre Node on Climate Data"] (RCC-CD for WMO Region VI (Europe and the Middle East)) since 2010.

In addition to the cooperation on data, DMI contributes active to The Regional Climate Centre Node on Climate Monitoring"] (RCC-CM for WMO Region VI (Europe and the Middle East)) providing national climate monitoring products and information.

The data and information products contribute to the Global Framework for Climate Services (GFCS).

Figure 5 Homepage of the European Climate Assessment & Dataset (ECA&D).



Annex F Denmark’s Third Biennial Report

– under the United Nations Framework Convention on Climate Change

Contents

I. Introduction

This report is Denmark's third biennial report (BR3) under the United Nations Framwork Convention on Climate Change (UNFCCC). The report has been prepared in accordance with the UNFCCC biennial reporting guidelines for developed country Parties contained in Decision 2/CP.17 (Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention - Document: FCCC/CP/2011/9/Add.1) adopted by the Conference of the Parties on its seventeenth session[1].

The report provides information on the historical and projected progress made in Denmark regarding Denmark's contribution to the achievement of joint European Union (EU) quantified economy-wide emission reduction target under the UNFCCC, including information on target, historic emissions, projected emissions and references to where further information can be found. Furthermore the report includes information on Denmark's provision of financial, technological and capacity-building support to Parties not included in Annex I to the Convention.

Information in relation to Greenland and the Faroe Islands is included in Chapter VII of this report as these parts of the realm are covered by Denmark's ratification of the Convention. However, as the Faroe Islands and Greenland are not members of the EU, the commitments of Denmark as a member of the EU do no apply to the Faroe Islands and Greenland.

In response to the recommendations from the review of Denmark's Second Biennial Report[2] additional estimates of the effects of implemented policies and measures are included in Table 3 of the Common Tabular Format (CTF), additional information on the factors affecting emissions trends is included in Table 5 of the CTF and additional information on projections of greenhouse gas emissions related to fuel sold to ships and aircrafts in international transport are included in Table 6(a) of the CTF.

The information to be reported electronically in the CTF contained in Decision 19/CP.18 (Document: FCCC/CP/2012/8/Add.3)[3] and revised by Decision 9/CP.21 (Document: FCCC/CP2015/10/Add.2)[4] is included in Chapter VIII of the biennial report.

[1] http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf (Decision pages 6-7 and Annex I pages 31-35).
[2] http://unfccc.int/resource/docs/2016/trr/dnk.pdf
[3] http://unfccc.int/resource/docs/2012/cop18/eng/08a03.pdf#page=3 (Decision pages 3-4 and Annex pages 5-42).
[4] http://unfccc.int/resource/docs/2015/cop21/eng/10a02.pdf#page=15

II. Information on greenhouse gas emissions and trends

A. SUMMARY INFORMATION FROM THE KINGDOM OF DENMARK'S GREEENHOUSE GAS INVENTORY ON EMISSIONS AND EMISSION TRENDS

The total inventories for the Kingdom of Denmark under the UNFCCC consistent with the data in the Common Reporting Format (CRF) reported under the UNFCCC in 2017 are given in Table 1 of the Common Tabular Format (CTF). The Kingdom of Denmark (or the Realm) comprises Denmark, Greenland and the Faroe Islands.

Greenland's and the Faroe Islands' greenhouse gas emissions are small compared with those of Denmark (each about 1 % of the total emissions), and they have been almost constant since 1990.

The emissions from the Kingdom (i.e. emissions from Denmark, Greenland and Faroe Islands) of the greenhouse gases CO_2 (carbon dioxide), CH_4 (methane), N_2O (nitrous oxide), and the so-called potent greenhouse gases (F-gases), which include HFCs (hydrofluorocarbons), PFCs (perfluorocarbons), SF_6 (sulphurhexafluoride) and NF_3 (nitrogen trifluoride) during the period 1990-2015 are shown in Figures 1-4, aggregated into the five main sectors and the most relevant sub-sectors as defined by the UNFCCC reporting guidelines (Decision 24/CP.19). The underlying data are included in the CTF. Total greenhouse gas emissions for the Kingdom measured in CO_2 equivalents on the basis of the global warming potential of each gas are shown together with the distribution with respect to gas and source/sector in Figures 5-6.

The inventory data to be reported electronically in Table 1 of the CTF are shown in Chapter VIII. Since Greenland and the Faroe Islands are not part of the EU territory, inventory data for Denmark alone and separately for Greenland and the Faroe Islands are also shown in ChapterVIII.

Carbon dioxide, CO_2

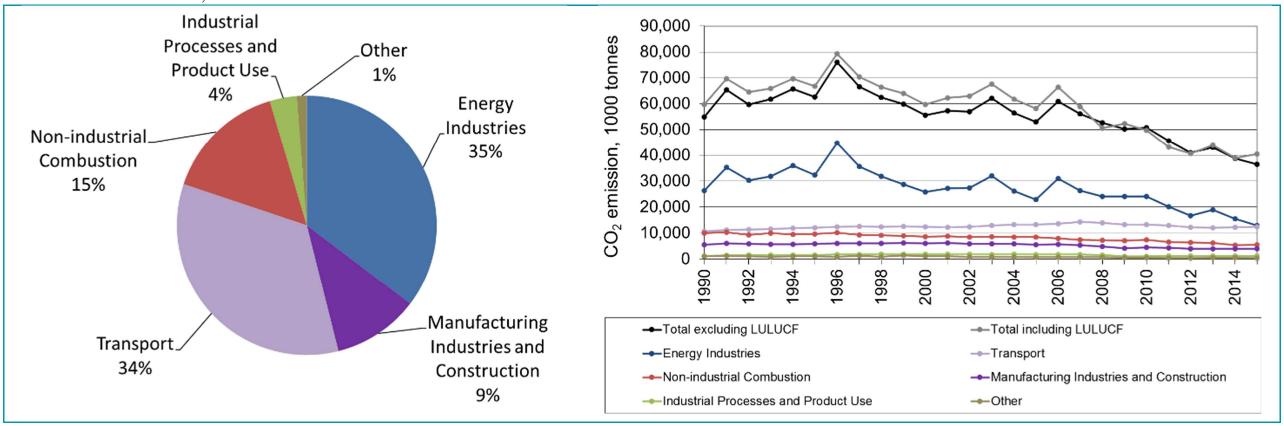
Most CO_2 emissions come from combustion of coal, oil and natural gas in energy industries, residential properties and in manufacturing industry. Road transport is also a major contributor. Outside the energy sector, the only major CO_2 emissions come from cement production, which accounts for 2-3 % of the annual national total. The transport sector is the only major emitting sector that has shown an increasing trend since 1990. However, in the latest years, CO_2 emissions from the transport sector have stabilised.

The relatively large fluctuations in the emissions from year to year are due to trade in electricity with other countries - primarily the Nordic countries. The large emissions in 1991, 1994, 1996, 2003 and 2006 are due to large electricity exports..

From 1990 to 1996, emissions showed a rising trend, but they have fallen since 1997 because many power stations have changed their fuel mix from coal to natural gas and biomass. Additionally, the production of renewable energy (mainly wind poser) has increased significantly. As a result of the reduced use of coal in recent years, most of the CO_2 emissions now come from combustion of oil or oil-based products, both in stationary and mobile sources. Also, there has been a decrease in gross energy consumption, especially since 2006.

In 2015, total actual CO_2 emissions inventoried under the Climate Convention, excluding land-use change and forestry (LULUCF), were about 34 % lower than in 1990. If LULUCF is included, net emissions were about 32 % lower.

Figure II.1: *CO_2 emissions by sector (2015) and development in 1990-2015 in kt CO_2*
Source: Nielsen et al., 2017.



Methane, CH_4

Anthropogenic methane (CH_4) emissions primarily stem from agriculture, landfills, and the energy sector, among which agriculture contributes the most by far.

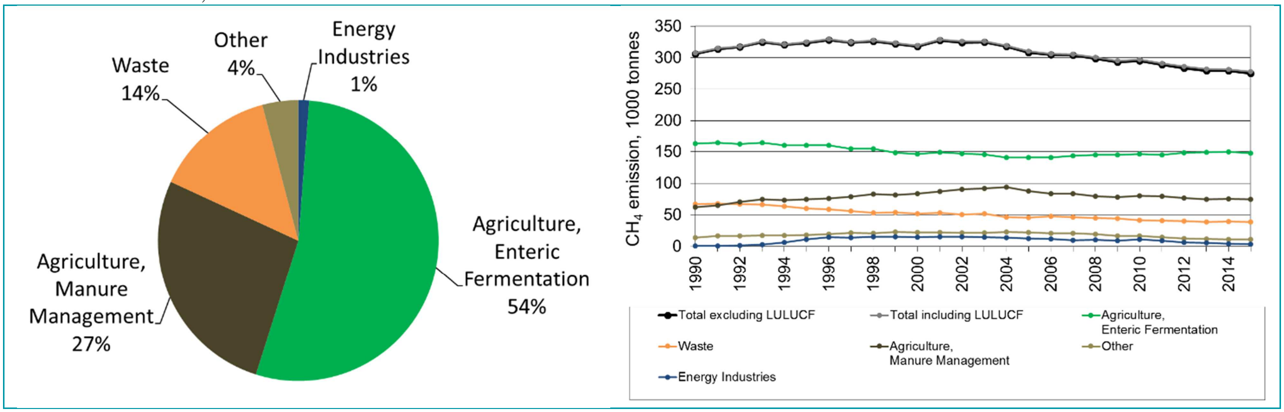
The emissions from agriculture are due to the formation of methane in the digestive system of farm animals (enteric fermentation) and manure management. Over the time series from 1990 to 2015, the emission of CH_4 from enteric fermentation has decreased by around 9 % due to a decrease in the number of cattle. However, in the same period the emissions from manure management increased by around 20 % due to a change in animal housing systems from traditional systems with solid manure towards slurry-based housing systems.

Emissions of methane from landfills are decreasing, because of the ban on landfilling of combustible waste. This has led to a decrease in the amount of landfilled biodegradable waste and hence the emissions. Also, contributing to the decrease in emissions was the increased CH_4 recovery in the early part of the time series. This recovery has decreased in later years due to less CH_4 production in the landfills.

Emissions of methane from the energy sector increased up to 2003 due to increased use of gas-driven engines, which emit large amounts of methane compared to other combustion technologies. However in later years new legislation establishing emission limits for existing gas-driven engines came into force pursuant to Statutory Order No. 720 of 5 October 1998, and combined with decreased use of gas engines, this has resulted in lower emissions.

In 2015, total CH_4 emissions were 10 % below the 1990 level.

Figure II.2 *CH_4 emissions by sector (2015) and development in 1990-2015 in kt CH_4*
Source: Nielsen et al., 2017.

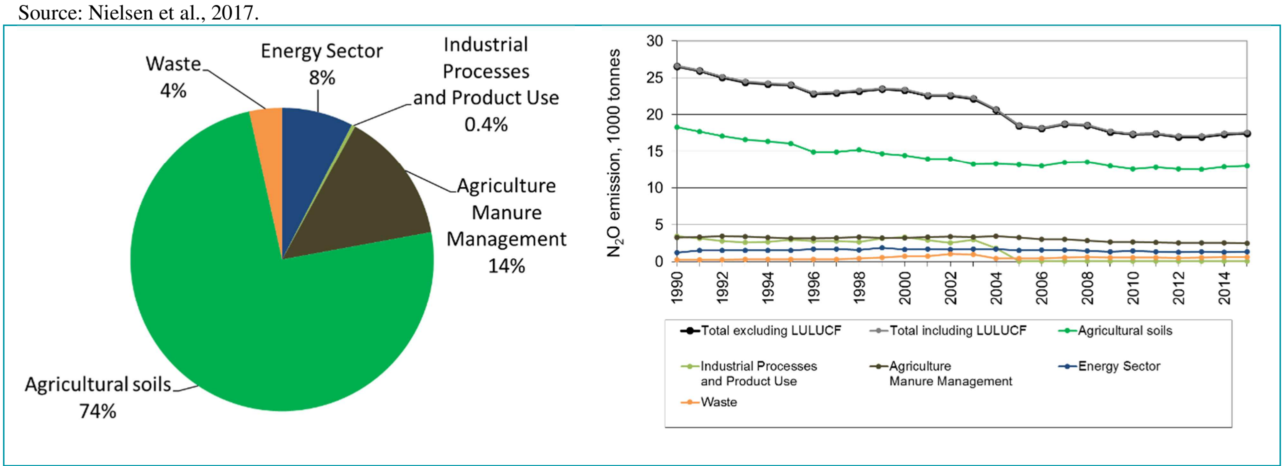


Nitrous oxide, N_2O

Agriculture constitutes the largest source by far of nitrous oxide (N_2O) emissions, since N_2O can be formed in the ground, where bacteria convert nitrous compounds from fertiliser and manure. Bacterial conversion of nitrogen also occurs in drain water and coastal water due to leaching and run off. This nitrogen largely comes from agriculture's use of fertiliser, and emissions from these sources are therefore included under agriculture. From 1990, N_2O emissions from agriculture have decreased by 28 % due to legislation to improve the utilisation of nitrogen in manure. The legislation has resulted in less nitrogen excreted per unit of livestock produced and a considerable reduction in the use of nitrogen fertilisers. The basis for the N_2O emission is then reduced. A small share of the nitrous oxide emissions originates from power and district heating plants, and cars with catalytic converters. Previously, a plant producing nitric acid was in operation in Denmark. However, this plant shut down in 2004, eliminating N_2O emissions from this activity.

In 2015, total N_2O were 34 % below the 1990 level.

Figure II.3 *N_2O emissions by sector and development in 1990-2015 in kt N_2O*
Source: Nielsen et al., 2017.



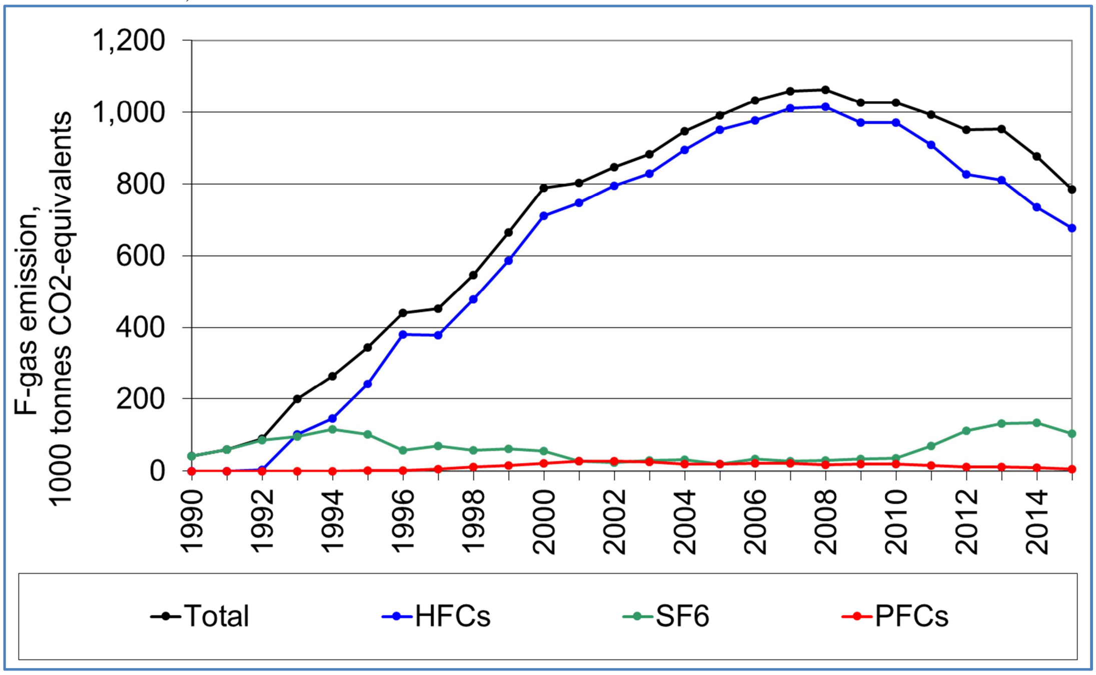
The f-gases: HFCs, PFCs, SF_6 and NF_3

The contribution of f-gases (HFCs, PFCs, SF_6 and NF_3), to Denmark's total emissions of greenhouse gases is relatively modest. However, the emissions of these gases increased significantly during the 1990s. Collection of data on the consumption of these substances started in the mid-1990s. Therefore, f-gas data and emissions inventories from before 1995 are less certain than in 1995 and later. In accordance with the Kyoto Protocol, Denmark has selected 1995 as the base year for the f-gases. There is no consumption of NF_3 in Denmark at any point during the time-series.

The HFCs, which are primarily used in refrigeration and air conditioning, are the biggest contributor to f-gas emissions. From 1995 to 2015 annual emissions of HFCs increased from 241 to 677 kt of CO_2 equivalents. However, emissions of HFCs peaked at 1015 kt of CO_2 equivalents in 2008. Emissions of PFCs increased in the same period from 0.6 to 4.9 kt of CO_2 equivalents, the emissions of PFCs peaked in 2002 at 28.0 kt of CO_2 equivalents. The emissions of SF_6 were at the same level in 1995 and in 2015 at103 kt of CO_2 equivalents. Emissions of SF_6 is peaking in the later years as double glazed windows using SF_6 in the early 1990'ties are currently being decommissioned. The emission peak in 2014 was at 133 kt of CO_2 equivalents.

The total emissions of HFCs, PFCs and SF_6 increased by 128 % from 1995 to 2015.

Figure II.4 *Development in HFC, PFC, and SF_6 emissions in 1990-2015 in kt CO_2-eq.*
Source: Nielsen et al., 2017.



Total Danish emissions and removals of greenhouse gases

Figures 5 and 6 show the development in the Danish greenhouse gas emissions and removals as CO_2 equivalents and by gases and sources according to the reporting guidelines under the Climate Convention. CO_2 is the most important greenhouse gas followed by N_2O and CH_4. As mentioned previously, emissions fluctuate in line with electricity trade. To illustrate this, the total greenhouse gas emission in 1996 (excl. LULUCF) was estimated to 91,466 kt of CO_2 equivalents and the total greenhouse gas emissions in 2003 was estimated to 77,653 kt of CO_2 equivalents (excl. LULUCF). Both these years were years with high electricity export. In comparison the total greenhouse gas emission in 1990, a year with high import, was 70,493 kt of CO_2 equivalents. In 2015 the total emissions were estimated to 49,321 kt of CO_2 equivalents,

Of the total Danish greenhouse gas emissions in 2015, CO_2 made up 73.9 %, methane 14.0 %, nitrous oxide 10.5 %, and f-gases 1.6 %. If CO_2 emissions by sources and removals by sinks from forests and soils are included (i.e. with LULUCF), then net total Danish greenhouse gas emissions corresponded to 53,475 kt of CO_2 equivalents in 2015. The data underlying Figures 5 and 6 are included in the CTF.

Figure II.5 *Danish greenhouse gas emissions by type of gas in 1990–2015,Mt CO_2-eq.*
Source: Nielsen et al., 2017.

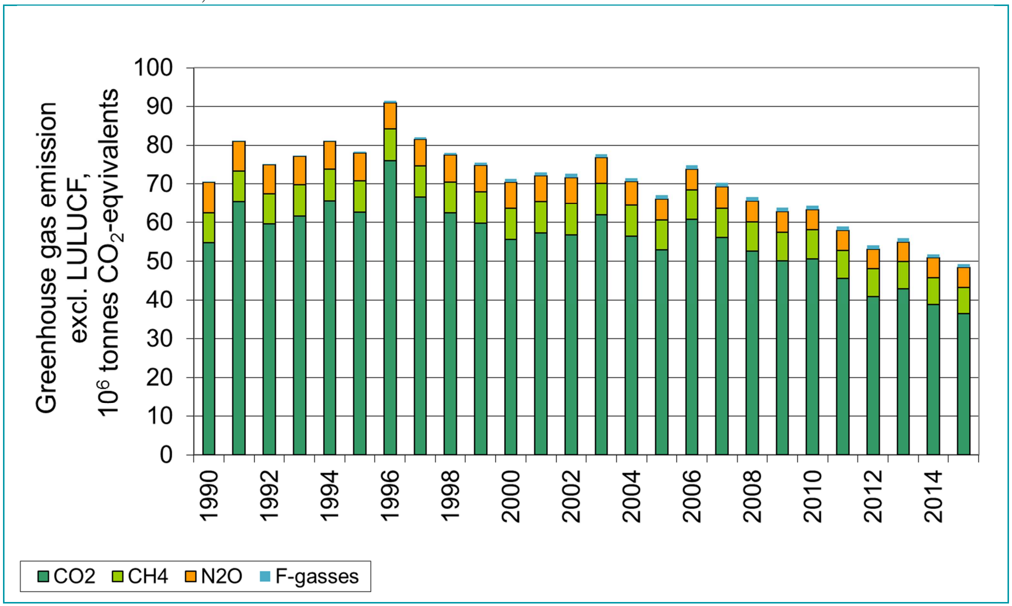
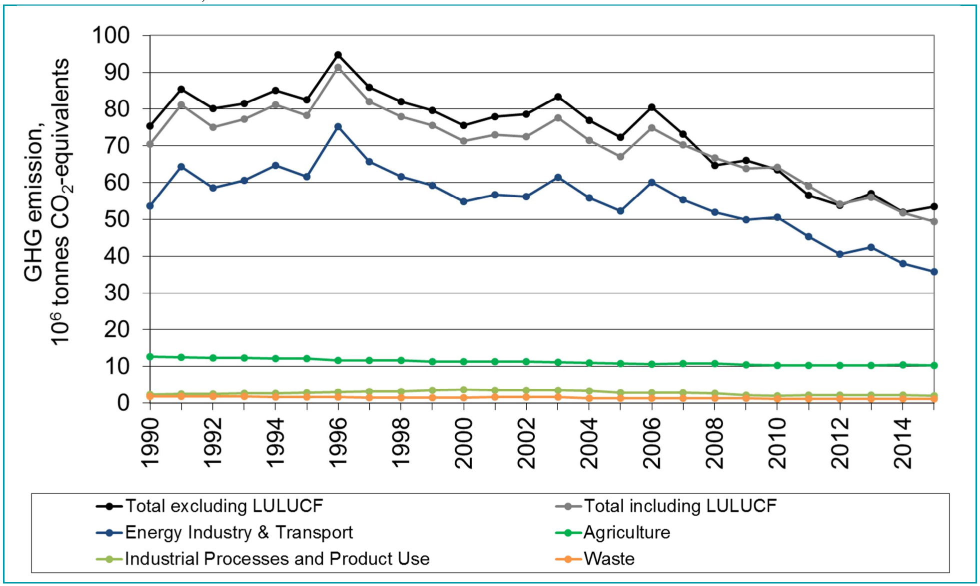


Figure II.6 *Danish greenhouse gas emissions by source/sector in 1990–2015, $MtCO_2$-eq.*
Source: Nielsen et al., 2017



As mentioned above, the emissions from Greenland and the Faroe Islands only contribute a very small share to the total emissions; hence the trends as described above are basically the trends in the emissions from Denmark.

B. Summary information on Denmark's national inventory arrangements

Organisation of work etc.

The Danish Centre for Environment and Energy (DCE) is responsible for producing the Danish greenhouse gas emission inventories and the annual reporting to the UNFCCC and is designated the single national entity under the Kyoto Protocol. Furthermore, DCE participates in work under the auspices of the UNFCCC, where guidelines for reporting are discussed and decided upon. DCE also participates in the EU monitoring mechanism for inventories of greenhouse gases, where guidelines for reporting to the EU are regulated.

The work on the annual inventories is carried out in cooperation with other Danish ministries, research institutes, organisations and private enterprises. The cooperating institutions provide a range of data that are needed to produce the inventory. DCE therefore has formal agreements with the most important partners to ensure that DCE receives the necessary data on time. For more comprehensive information, please see Nielsen et al. (2017).

Calculation methods

The Danish emission inventory is based on the IPCC guidelines for calculation of greenhouse gas emissions (the 2006 IPCC Guidelines) and the European CORINAIR (COoRdination of INformation on AIR emissions) programme for calculation of national emissions. Generally, emissions are calculated by multiplying the activity data (e.g. fuel consumption, number of animals or vehicles) by an emission factor (e.g. the mass of material emitted per unit of energy, per animal or per vehicle). Activity data are mainly based on official statistics. The emission factors are either plant-specific, country-specific, default factors from the IPCC guidelines, or values from international scientific literature.

Key categories

The choice of methodological tier for the individual categories depends, among other things, on the significance of the source. The categories that together accounted for 95 % of greenhouse gas emissions in the base year, in 2015 or accounted for 95 % of the change in emission levels from the base year to the most recently calculated year (2015) are defined as key categories according to the IPCC guidelines. An analysis of the Danish inventory shows that 49 categories account for 95 % of total greenhouse gas emissions when considering the inventory including LULUCF and using Approach 1 of the 2006 IPCC Guidelines and that the four largest sources – together accounting for about 46 % – are CO_2 emissions from road transport, CO_2 emissions from combustion of coal at stationary combustion plants, CO_2 from combustion of natural gas at stationary combustion plants and CH_4 from enteric fermentation.

Procedure for recalculation

At the same time as the annual calculation of emissions for another year takes place, any necessary recalculations of emission inventories from previous years are also carried out. Recalculations are made if errors or oversights are found or if better knowledge becomes available, e.g. updated statistical data, improvements of methodologies, updated emission factors due to new knowledge and research. In order to ensure consistent emission inventories, recalculations will be carried out on the whole time series, as much as circumstances permit and following the guidance in the IPCC Guidelines.

Uncertainty

Uncertainty in the greenhouse gas inventories is calculated as recommended in the IPCC guidelines and covers 100 % of the total Danish greenhouse gas (GHG) emissions reported under the Kyoto Protocol. The result of the calculations shows that total GHG emissions were calculated using Approach 1 of the 2006 IPCC Guidelines to have an uncertainty of 5.4 % and the uncertainty in the trend in GHG emissions since 1990 was calculated to be ± 2.0 %. The uncertainties are largest for N_2O emissions from stationary combustion and agricultural land and CH_4 emissions from enteric fermentation and solid waste disposal on land.

Quality assurance and quality control

As part of the national system, DCE is drawing up a manual to use in quality assurance and quality control of the emission inventories. The manual is in accordance with the 2006 IPCC Guidelines. The ISO 9000 standards are also being used as important input for the plan.

Reports are written for all sources of emissions that describe in detail and document the data and calculation methods used. These reports are evaluated by persons external to DCE who are experts in the area in question, but not directly involved in the inventory work. In addition, a project has been completed in which the Danish calculation methods, emission factors and uncertainties are compared with those of other countries, in order to further verify the correctness of the inventories.

For a more detailed description of the QA/QC system, please see the Danish National Inventory Report (Nielsen et al., 2017).

Annual reporting

DCE produces an annual report (National Inventory Report – NIR) for the Climate Convention in which the results of the calculations are presented and the background data, calculation methods, plan for quality assurance and control, uncertainty and recalculations are described and documented. At the request of the Climate Convention, the report is evaluated each year by international experts. Over the years, improvements have been made regarding the quality and documentation of the greenhouse gas inventory, as a result of the quality assurance and control procedures and the evaluations of national and international experts. The planned improvements can be found in the following section.

Improvements of emission inventories

A number of improvements have been made to the Danish greenhouse gas emission inventories since Denmark's Second Biennial Report to the Climate Convention (BR2). The improvements have either been at the initiative of DCE, or as a result of external reviews of the inventories. The majority of improvements have been concerned with better documentation, i.e. improvements in transparency. Furthermore, overall focus is on improving procedures for quality assurance and control and on improving documentation of the national emission factors.

Procedures for the official consideration and approval of the inventory

The complete emission inventories for the three different submissions (EU, Kyoto Protocol and UNFCCC) by Denmark are compiled by DCE and sent for official approval along with the documentation report (NIR). In recent years the responsibility for official approval has changed. Previously it was the Danish Energy Agency under the Ministry of Energy, Utilities and Climate, but now the responsibility lies with the Ministry itself. This means that the emission inventory is finalised no later than March 15, so that the official approval is prior to the reporting deadlines under the UNFCCC and the Kyoto Protocol.

Changes in national inventory arrangements since the previous submission

No changes have been made to the inventory arrangements since the submission of BR2.

III. Quantified economy-wide emission reduction target

A. THE JOINT EU TARGET FOR 2020

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20 % compared to 1990 levels[5]. As this target under the convention has only been submitted by EU-28 and not by each of its Member State (MS), there are no specified convention targets for single MS. Due to this, Denmark[6], as part of the EU-28, takes on a quantified economy-wide emission reduction target jointly with all Member States.

With the 2020 climate and energy package the EU has set internal rules which underpin the implementation of the target under the Convention. The 2020 climate and energy package introduced a clear approach to achieving the 20 % reduction of total GHG emissions from 1990 levels, which is equivalent to a 14 % reduction compared to 2005 levels. This 14 % reduction objective is divided between two sub-targets, equivalent to a split of the reduction effort between ETS and non-ETS sectors of two thirds vs one third (EU, 2009[7]).

Under the revised EU ETS Directive[8], one single EU ETS cap covers the EU Member States and the three participating non-EU Member States (Norway, Iceland and Liechtenstein), i.e. there are no further differentiated caps by country. For allowances allocated to the EU ETS sectors, annual caps have been set for the period from 2013 to 2020; these decrease by 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012). The annual caps imply interim targets for emission reductions in sectors covered by the EU ETS for each year until 2020. For further information on the EU ETS and for information on the use of flexible mechanisms in the EU ETS see EU BR3.

Non-ETS emissions are addressed under the Effort Sharing Decision (ESD)[9] . The ESD covers emissions from all sources outside the EU ETS, except for emissions from international maritime, domestic and international aviation (which were included in the EU ETS from 1 January 2012) and emissions and removals from land use, land-use change and forestry (LULUCF). It thus includes a diverse range of small-scale emitters in a wide range

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[5] FCCC/SB/2011/INF.1/Rev.1 and FCCC/AWGLCA/2012/MISC.1
[6] Since Greenland and the Faroe Islands are not included in the EU territory, the commitments of Denmark, as a member of the EU, are not applicable to these parts of the Realm.
[7] Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (OJ L 140, 05.06.2009, p. 63) (http://eur-lex.europa.eu/ LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:00 63:0087:en:PDF)
[8] Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community
[9] Decision No 406/2009/EC

of sectors: transport (cars, trucks), buildings (in particular heating), services, small industrial installations, fugitive emissions from the energy sector, emissions of fluorinated gases from appliances and other sources, agriculture and waste. Such sources accounted for 55 % of total GHG emissions in the EU in 2013.

While the EU ETS target is to be achieved by the EU as a whole, the ESD target was divided into national targets to be achieved individually by each Member State. In the ESD national emission targets for 2020 are set, expressed as percentage changes from 2005 levels. These changes have been transferred into binding quantified annual reduction targets for the period from 2013 to 2020 (EC 2013 and EC 2017)[10,11,12] expressed in Annual Emission Allocations (AEAs). The quantified annual reduction targets 2013-2020 of Denmark are tightened from 36.8 Million AEAs in 2013 to 32.1 Million AEAs in 2020. In the year 2013, 2014 and 2015 verified emission of stationary installations covered under the EU-ETS in Denmark summed up to 21.6, 18.4 and 15.8 Mt CO_2 equivalents respectively. With total GHG emissions of 55.0, 50.8 and 48.3 Mt CO_2 equivalent respectively (without LULUCF, with indirect, without CO_2 from international aviation) the shares of these ETS emissions in 2013, 2014 and 2015 were 39.3 %, 36.2 % and 32.7 % respectively.

The monitoring process is harmonized for all European MS, especially laid down in the Monitoring Mechanism Regulation[13]. The use of flexible mechanisms is possible under the EU ETS and the ESD. For the use of CER and ERU under the ETS, please refer to the European BR3.

The ESD allows Member States to make use of flexibility provisions for meeting their annual targets, with certain limitations. There is an annual limit of 3% of verified emissions in 2005 for the use of project-based credits for each MS. For Denmark the amount of credits possible to use is 1.1 Million CERs and ERUs. If these are not used in any specific year, the unused part for that year can be transferred to other Member States or be banked for own use until 2020. As Denmark (together with Austria, Belgium, Cyprus, Finland, Ireland, Italy, Luxembourg, Portugal, Slovenia, Spain and Sweden) fulfills additional criteria as laid down in ESD[14] Article 5(5), an additional use of credits is possible from projects in Least Developed Countries (LDCs) and Small Island Developing States (SIDS) up to an additional 1 % of Denmark's verified emissions in 2005. For Denmark the additional amount of credits possible to be used is 0.4 Million CERs and ERUs. These additional credits are not bankable and transferable.
Following from these limits, approximately 750 Mt of international credits can be used by EU Member States during the period from 2013 to 2020 in the ESD. As Denmark project to reach its targets 2013-2020 under the ESD without the use of CERs and ERUs (the WEM projection from March 2017), Denmark does not intend to use CER- or ERU-credits under the ESD-part of Denmark's contribution to the joint EU target for 2020 under the convention.

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[10] Commission decision of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (2013/162/EU)
[11] Commission Implementing Decision of 31 October 2013 on the adjustments to Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/ EC of the European Parliament and of the Council (2013/634/EU)
[12] The EU Commission's 2017 revision of the ESD target path 2017-2020: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.209.01.0053.01.ENG&toc=OJ:L:2017:209:TOC
[13] Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC
[14] Decision No 406/2009/EC

Table 2 of the CTF included in Chapter VIII of this biennial report contains information on the EU target for 2020 under the UNFCCC regarding the base year (1990), the gases included (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) and sectors covered (Energy, Transport (domestic and CO_2 from international aviation to the extent it is included in the EU ETS), Industrial Processes, Agriculture and Waste), which set of global warming potentials on which the target is based (AR4), the approach to counting emissions and removals from the land use, land-use change and forestry (LULUCF) sector (excluded – i.e. no accounting towards the joint EU target for 2020 pledged under the Convention), the possible scale of contribution from use of international market-based mechanisms in achieving the emission reduction target and other relevant information (the limits specified under the EU ETS and ESD). For further information on the EU target for 2020 under the UNFCCC see EU BR3.

Since Greenland and the Faroe Islands are not included in the EU territory, the EU target for 2020 under the UNFCCC is not applicable to these parts of the Realm.

B. OTHER EMISSION REDUCTION TARGETS

The EU target and Denmark's target under the first commitment period of the Kyoto Protocol (2008-2012)

In relation to the 1st commitment period under the Kyoto Protocol (2008-2012), the EU has committed itself to reducing emissions of greenhouse gases on average to 8 % below the level in the so-called base year; 1990 for CO_2, methane, and nitrous oxide and either 1990 or 1995 for industrial greenhouse gases. Under the EU15 Burden Sharing of this target, Denmark has committed itself to a reduction of 21% as an element of the burden-sharing agreement within the EU in accordance with Article 4 of the Kyoto Protocol.

With Greenland and Faroe Island not being included in the EU territory, and with a territorial reservation for the Faroe Islands in accordance with the Vienna Convention, when the Kyoto Protocol was ratified by the Kingdom of Denmark, the quantified emission limitation for Greenland in 2008-2012 is 92 % of Greenland's base-year emissions. On the basis of total base-year emissions estimated at 69,978,070 tonnes CO_2 equivalents, the initial review report concluded in 2007 that the total assigned amount (number of AAUs issued) for Denmark and Greenland for the period 2008-2012 is 276,838,955 tonnes CO_2 equivalents[15]. In addition, Denmark received 5,000,000 AAUs as base year compensation under the EU15 Burden Sharing Agreement. Following from activities under Articles 3.3 and 3.4 of the Kyoto Protocol Denmark and Greenland achieved a further net-contribution of 8,654,523 Removal Units (RMUs) in the first commitment period and following from activities under Articles 6 (JI) and 12 (CDM) of the Kyoto Protocol, Denmark and Greenland acquired 16,563,791 JI/CDM credits (ERUs, CERs and early credits as AAUs) for the first commitment period until the end of the true-up period (18 November 2015).

Before the end of the true-up period Denmark and Greenland retired in total 297.984.143 Kyoto units which is a little more than Denmark's and Greenland's total greenhouse gas emissions 2008-2012 amounting to 297,947,591 cf. the last inventory review report for the first commitment period[16]. After Denmark's cancellation of 195.974 units as off-set of greenhouse gas emissions from COP15 held in Copenhagen in 2009 and air traffic by governmental officials in 2009-2011, until aviation was included under EU ETS, a further

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[15] http://unfccc.int/resource/docs/2007/irr/dnk.pdf
[16] http://unfccc.int/resource/docs/2015/arr/dnk.pdf

surplus of 3,400.000 units were cancelled in accordance with decisions taken by the Danish government and the Greenlandic government in 2015.

The EU target and Denmark's target under the second commitment period of the Kyoto Protocol (2013-2020)

In addition to the EU target under the Convention, the EU also committed to a legally binding quantified emission limitation reduction commitment for the second commitment period of the Kyoto Protocol (2013-2020). This target will also be fulfilled jointly by the EU and its Member States. Denmark's contribution to the joint fulfillment of this target equals Denmark's commitment under EU Climate an Energy Package. For further information on the EU target under the second commitment period of the Kyoto Protocol see EU-BR3. Since Greenland are not included in the EU territory, the joint EU target for the second commitment period of the Kyoto Protocol is not applicable to this part of the Realm and with a territorial reservation to the Faroe Island, when the Kyoto Protocol was ratified in 2002, the protocol is not applicable to the Faroe Islands.

On request from the government of Greenland, a territorial reservation to Greenland will be taken, when the Kingdom of Denmark ratify's the the Doha amendment for the second commitment period 2013-2020 under the Kyoto Protocol.

IV. Progress in achievement of quantified economy-wide emission reduction targets and relevant information

A. MITIGATION ACTIONS AND THEIR EFFECTS

Mitigation actions

Information on Denmark's portfolio of mitigation actions, including information on policies and measures implemented or planned to achieve the economy-wide emission reduction targets described in section III of this biennial report, is included in Chapter 4 of Denmark's Seventh National Communication.

A summary table on Denmark's portfolio of mitigation actions organised by sector: energy with further specification of energy related measures within the business, transport and household sectors, industrial processes and product use, agriculture, LULUCF and waste as well as cross-cutting taxes and duties, and with information on which of the following gases will be affected by the individual measure: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, is included as Table 3 in the Common Tabular Format (CTF) in Section VIII of this biennial report.

Since the last biennial report (BR2 and its CTF, January 2016) three new measures have been implemented. These are included in Table 3 of the CTF (see section VIII, Table 3, HO-6 (facilitation of a market for energy services based on heatpumps in rural areas), AG-12 (The Food and Agricultural Package) and AG-13 (The Nature Package). For some of the measures included in BR2 and its CTF the information has been updated for BR3 and its CTF. Where new or updated estimates of the effects of measures or groups of measures have been provided, these are also included in Table 3 in the CTF.

A sustainable green transition

As stated in the Government Platform (November 2016)[17] the Government will continue to pursue an ambitious green transition in a sustainable and efficient manner where the interest of Danish jobs and competitiveness goes hand in hand with respect for the environment and climate.

The government takes the lead in the green transformation, and therefore the life cycle perspectives should increasingly be taken into account in the decision making for public investments and acquisitions in order to be assessed by the total lifetime costs, rather than the investment costs alone.

[17] http://www.stm.dk/multimedia/Regeringsgrundlag2016.pdf

With the climate agreement from Paris (December 2015), the world leaders agreed that the global average temperature increase should be kept well below 2 degrees and preferably not exceed 1.5 degrees.

Denmark will nationally work to contribute to the fulfilment of this ambitious goal, but taking into account Denmark's share of the total greenhouse gas emissions; it is of utmost importance to seek influence internationally. Therefore, the government's climate policy has both a national and an international focus.

National focus

A target of 40 per cent GHG reduction by 2020 compared to 1990, has for years helped to promote climate action and transformation of the energy system. Recently, a large majority of the parties decided to replace the PSO and instead finance the costs of renewable energy through the national budget. This change will reduce the price of electricity and increase power consumption. In the short term this could increase greenhouse gas emissions from Danish soil, but promote the transition towards a society based on green power, and contribute to reducing global greenhouse gas emissions.

Greenhouse gas emissions will continue to decrease. Denmark is ready to contribute to the EU's reduction target of at least 40 per cent by 2030 (compared with 1990 levels) by taking on an ambitious 2030 targets for reducing emissions outside the quota system. In October 2017 Denmark agreed to a reduction in non-ETS emissions in the period 2021-2030, rising to 39% by 2030 relative to 2005, when the flexible mechanisms of the Effort Sharing Regulation are taken into account. The final approval by the European Parliament is still pending. In 2018, the government will prepare a cost-effective strategy for meeting Denmark's reduction target in 2030. The Government will among other things include recommendations from the Danish Climate Council. The EU has a target of 27 per cent renewable energy by 2030. This target has already been met by Denmark. Denmark will go further than that. The Government will therefore pursue a target of at least 50 per cent of Denmark's energy needs to come from renewable sources by 2030.

The Government will evaluate the objective of phasing in of renewable energy with appropriate intervals (stock-taking). Evaluations will in particular take stock of the speed in market maturation of renewable energy technologies and the development in comparable prices for different forms of energy. In connection with the evaluations it should be decided whether renewable energy should be phased in more quickly. The opposite could also be the case, if the expected developments in technologies and prices are absent.

This new goal is to ensure that Denmark maintains a high speed in the green transition so that the goals for 2050 can be reached in a manner which is as cost effective as possible. The Government's long-term goal for Denmark in 2050 is a low-emission society independent of fossil fuels. The Danish long-term 2050 goal is to ensure that Denmark complies with the EU's target of 80-95 per cent reduction of greenhouse gases by 2050.

The Government will in 2018 make proposals for a new broad energy agreement after 2020, partly on the basis of the national Energy Commission's work. A new energy agreement aims to ensure the continued transformation of the energy sector.

Denmark is in a unique position to continue expanding with offshore wind. The costs of offshore wind power have fallen sharply in recent years. The Government's aim is that

Denmark will be the first country in the world where offshore wind can survive on market conditions. In order to ensure a decision basis for a continued expansion, the government will launch a screening of the North Sea and the Baltic Sea for possible locations for additional offshore wind.

The electricity market must be further developed and the support systems for renewable energy must be harmonized. As part of the electrification of the energy system, the Government will promote heat pumps and utilize surplus. Furthermore, the Government will analyse barriers for electricity storage.

Future flexible energy market requires joint planning of energy and flexibility on both the supply and demand side. The Government will prepare an action plan for smart energy, including focusing on the opportunities that digitization brings.

As stated in the Government Platform, the Danish energy system could become the most innovative, efficient and forward-thinking in the world. It requires that the Danish energy research continuously is the absolute world elite. The Government will therefore strengthen the Danish energy research and actively exploit cooperation in Mission Innovation Initiative.

As also stated in the Government Platform, the Government will implement the political agreement on the introduction of a blending requirement of 0.9 per cent advanced biofuels in fuel for land transport.

International focus

To ensure international progression in the green transition is a key foundation for the government's climate policy. This is done via the EU, focusing on the establishment of ambitious goals and policies in the Community and an ambitious global, international climate effort, including under the auspices of the UN and through bilateral cooperation.

Denmark wants to actively contribute to the EU's climate efforts.

As laid out in Government Platform, the government has been working actively to ensure structural reforms of the European Emission Trading Scheme (ETS), which can reduce the amount of allowances, so that there are more consistent and clear price signals in the future - within and outside the quota sector for the benefit of the green transition.

Domestic institutional arrangements

Information on Denmark’s domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards Denmark’s economy-wide emission reduction targets described in section III of this biennial report, is included in Chapter 4 of Denmark’s Seventh National Communication (NC7). Since the last biennial report (BR2 and its CTF submitted in 2016) the only change in Denmark’s domestic governmental institutional arrangements in relation to climate change is that as of October 2016 the Ministry of Energy, Utilities and Climate has replaced Danish Energy Agency under the ministry in the role of supporting the Minister for Energy, Utilities and Climate in climate change issues.

In 2014 the Danish Parliament passed the Danish Climate Change Act. The Act and related notes have the following main content:

1) Establishment of an independent, academically based Climate Council.
2) An annual Climate Policy Report for the Danish Parliament.
3) A process for setting national greenhouse gas reduction targets.

In accordance with the Climate Change Act an independent, academically based Climate Council was established in 2015. The Climate Council will provide the government with independent advice on the transition to a low-emission society i.e. a resource-effective society with an energy supply based on renewable energy and significantly lower emissions of greenhouse gases from other sectors, also taking into consideration economic growth and development. A minimum of once a year, the Climate Council will provide the government with recommendations on climate mitigation initiatives with consideration for cost-effectiveness, growth, competitiveness and employment and scientific recommendations on the necessary climate policy initiatives. The Climate Council will have the following main duties:

- Assessing the status of Denmark's fulfilment of national greenhouse gas reduction targets and international climate obligations.
- Analysing possible transition pathways towards a low-emission society by 2050 and potential measures for achieving greenhouse gas reductions.
- Preparing recommendations on the formulation of climate policy, including the choice of means and transition pathways.
- Contributing to the public debate. The Climate Council will, to the necessary extent, consult and involve relevant parties in the preparation of its analyses and work. The Climate Council will therefore establish a stakeholder group with representatives from relevant stakeholder organisations, professional associations, companies, NGO's, municipalities and regions etc.

In June 2017 the Climate Council provided the government with its recommendations published in the council's main report 2017 "*Transition Towards 2030 - Building Blocks for a Low-Carbon Society in the period until 2030*". In the annual climate policy statement to the parliament published on 13 December 2017[18], the Minister for Energy, Utilities and Climate provided the government's position in relation to the recommendations from the Climate Council.

Response measures

In Denmark, the government's proposals for new response measures to put before the parliament are in most cases accompanied by an assessment of the consequences in relation to socio-economic cost and – when effects on the environment are expected – also by an assessment of the consequences in relation to Denmark's greeenhouse gas emissions.

Further information is available in Chapter 15 of the National Inventory Report.

B. ESTIMATES OF EMISSION REDUCTIONS AND REMOVALS AND THE USE OF UNITS FROM THE MARKET-BASED MECHANISMS AND LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES

[18] http://www.ft.dk/samling/20171/redegoerelse/r6/skriftlig.htm and http://efkm.dk/media/11656/klimapolitisk-redegoerelse-2017.pdf

Base-year emission information

In relation to the joint EU28 economy-wide emission reduction target described in section III of this biennial report, information on EU28 base year (1990) emissions is contained in EU BR3 and its CTF.

As LULUCF is excluded from the joint EU28 economy-wide emission reduction target, information on LULUCF and total GHG emissions, including emissions and removals from the LULUCF sector is not relevant.

As there is no use of CERs and ERUs included in the base year, information on estimates of the use of units from market-based mechanisms is not applicable.

Denmark's contribution to EU28 total base year emissions under the convention amounts to 70.4 $MtCO_2$eq. in 1990 excluding CO_2 from international aviation ("Total CO_2 equivalent emissions without LULUCF, with indirect CO_2")[19]. On guidance from the European Commission CO_2 from international aviation reported in the memo item of Denmark's greenhouse gas inventory ("inventory CO_2" from international aviation based on fuel sold to aircrafts starting from Danish airports) could be used as a proxy for CO_2 from international aviation activities reported by aviation entities registered in the Danish quota register ("entity CO_2" from international and domestic aviation based on fuel used by Danish entities). When CO_2 from international aviation reported in the memo item of Denmark's greenhouse gas inventory is included, Denmark's contribution to EU28 total base year emissions amounts to 72.1 $MtCO_2$eq. in 1990.

Annual information on progress towards the emission reduction target with emissions, removals and the use of units from market-based mechanisms

For the quantification of the progress to 2020 targets, the development of GHG emissions is the key indicator. The Convention target of a reduction of emissions by 20 % from 1990 to 2020 only refers to the emissions of the EU-28 as a whole. GHG emissions of EU-28 are calculated as the sum of MS emissions.

Information on EU28 annual emissions for 2010, 2011, 2012, 2013, 2014 and 2015 is contained in EU BR3 and its CTF.

With this, GHG emissions of Denmark[16] are part of EU28 emissions contributing with 1.2 % of total EU28 GHG emissions in the year 2015.

The development of GHG emissions is reported in CTF Table 4 for Denmark[16].

Denmark's contribution ("Total CO_2 equivalent emissions without LULUCF, with indirect CO_2")[16] to EU28 total annual greenhouse gas emission in 2010, 2011, 2012, 2013, 2014 and 2015 amounts to 63.2, 58.0, 53.1, 55.0, 50.8 and 48.3 $MtCO_2$eq. respectively before CO_2 from international aviation reported in the memo item of Denmark's greenhouse gas inventory is included, and 65.6, 60.4, 55.6, 57.5, 53.5 and 51.0 $MtCO_2$eq. respectively when CO_2 from international aviation reported in the memo item of Denmarks greenhouse gas inventory is included.

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[19] Excluding GHG emissions in Greenland and the Faroe Islands since these parts of the realm are not in the EU28 territory.

Emissions in the sector of LULUCF are not included under the convention target, therefore they are not included in CTF Tables 4, 4(a)I and 4(a)II. Since Tables 4(a)I and 4(a)II are only about LULUCF, these tables are not applicable at all.

The use of flexible mechanisms takes place on the one hand by operators in the EU ETS, on the other hand by governments for the achievement of ESD targets. For information on the use in the ETS, please see the EU BR3. As the latest GHG projection (the WEM projection from March 2017) shows that Denmark's GHG emissions under the ESD are expected to be below the ESD target path 2013-2020 for Denmark, Denmark does not plan to use CERs or ERUs under the ESD.

V. Projections

Information on updated projections of Denmark's greenhouse gas emissions in 2020 and 2030 is included as Table 6 in the CTF in Section VIII of this biennial report.

Table 6(a) in the CTF contains the results from the "with (existing) measures" (WEM) projection from March 2017[20].

Table 6(b) contains the results from the "without measures" (WOM) projection from December 2017 elaborated on the basis of estimates contained in:

- the 2005 Effort Analysis[21] described in Annex B2 of Denmark's Seventh National Communication,
- the 2013 Analysis of the Effects of Selected Measures for the National Audit Office[22] described in Annex B3 of Denmark's Seventh National Communication, and
- the 2017 Analysis of the CO_2 reduction effects of Renewable Energy measures and Energy Efficiency measures described in Annex B4 of Denmark's Seventh National Communication.

As the "with measures" projection shows that no new measures will be needed for achieving Denmark's target under the EU Climate and Energy Package – the framework for Denmark's contribution to the achievement of the joint EU target for 2020 under the UNFCCC – there has not been a need for adopting additional measures and prepare a "with additional measures" (WAM) projection for Table 6(c).

In Table 5 of the CTF in Section VIII, a summary of key variables and assumptions used in the projections is given.

Further information on models and methodologies used, is contained in Chapter 5 and Annex C of Denmark's Seventh National Communication. There have been no significant changes in the models and methodologies used for the March 2017 projection compared to the December 2015 projection reported in BR2.

Additional information on assumptions, projection parameters, sensitivity analyses and results is available in the background report "Baggrundsrapport til Basisfremskrivning

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[20] https://ens.dk/sites/ens.dk/files/Analyser/denmarks_energy_and_climate_outlook_2017.pdf and https://ens.dk/sites/ens.dk/files/Analyser/memo_on_new_estimate_of_non-ets_deficit_for_the_period_2021_to_2030.pdf

[21] http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf

[22] https://ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf

2017" (Danish Energy Agency, March 2017 (in Danish))[23] and "Projection of Greenhouse Gases 2016-2035" (DCE, November 2017 (in English))[24].

[23] https://ens.dk/sites/ens.dk/files/Basisfremskrivning/baggrundsrapport_til_bf_2017.pdf
[24] http://envs.au.dk/en/knowledge/air/emissions/projection/

VI. Provision of financial, technological and capacity-building support to developing country Parties

VI.1 STRATEGIES FOR DANISH DEVELOPMENT ASSISTANCE AND CLIMATE CHANGE

Since 2012, the Danish policy towards development assistance and climate finance has been guided by various frameworks, namely the overall strategy 'A Right to Better Life', supplemented by 'A Greener World for all: Strategic Framework for Natural Resources, Energy and Climate' (2013) and 'the Green Growth Guidance Note' (2014).

In January 2017, the Danish Government presented its future strategy for development cooperation and humanitarian action, 'The World 2030'. This new strategy specifically targets support to five Sustainable Development Goals: Goal No. 5 (gender equality), Goal No. 7 (sustainable energy), Goal No. 13 (climate), Goal No. 16 (peace, justice, institutions) and Goal No. 17 (partnerships).

Public support to developing countries for climate actions should comply with the 'Danida Aid Management Guidelines' and 'the Danish Finance Act'.

VI.1.1 Danish climate finance

The public Danish support to climate relevant action in developing countries is provided through dedicated mechanisms, such "Climate envelope", and as integrated element of other development cooperation and financing instruments and programmes. A significant part of the Danish climate finance is channelled through various international and multilateral development institutions, such as the World Bank, African Development Bank or UNDP, either as core funding or through special climate windows and programmes of these institutions. Likewise, Denmark provides parts of its climate financing through the operating entities of the financial mechanisms of UNFCCC – the Global Environmental Facility and the Green Climate Fund.

Denmark seeks to support both adaptation and mitigation related action with a view to contribute to sustainable development. Danish support to adaptation related activities and programmes address underlying causes of vulnerability, and contribute to building resilience against crises, natural disasters and the impacts of climate change. The support also assists developing countries in their efforts to integrate adaptation and emission reduction considerations in their national planning and policy preparation and implementation, including as part of supporting their Nationally Determined Contributions.

Through both multilateral and bilateral assistance, Denmark supports increased access to sustainable energy in developing countries, improvement in energy efficiency and improved access to climate-friendly technologies. This is done by strengthening the national and local knowledge and capacity, by supporting the policy development and implementation, and through support to investments in preparation and implementation of specific mitigation projects. Furthermore, Denmark offers technical assistance and advice on development of investment opportunities and by strengthening local businesses in developing countries.

The 'Climate Envelope' is an important part of Danish climate financing as a dedicated mechanism for supporting mitigation and adaptation activities in developing countries. The 'Climate Envelope' is programmed jointly by both the Danish Ministry of Foreign Affairs and the Danish Ministry of Energy, Utilities and Climate. In the period 2013-2016, the finance commitments from the ‘Climate Envelope’ have on average constituted around DKK 400 million annually.

A significant part of the Danish climate engagements are targeting a range of priority partner countries, with whom Denmark has a long-term partnership for sustainable development. The Danish bilateral development assistance is decentralised to the Danish representations in the partner countries, which has the primary responsibility for the dialog with the respective partner countries and the related programming and management of the development cooperation. Denmark cooperates with national and local government authorities, international agencies, civil society organisations, private companies, research institutions and other relevant actors, and specific projects and programmes are identified and prepared in close collaboration with national partners.

Denmark is one of few developed countries that fulfil the UN goal of contributing a minimum of 0.7 percent of the gross national income to development assistance. About 30% of the total budget is channelled as core contributions to multilateral institutions, mainly the EU, the UN, the World Bank and the regional development banks that play important roles in the global climate finance landscape. Contributions to the core functions of the organisations are complemented by targeting thematic and regional initiatives, where Denmark has special interests, including to various climate relevant programmes and trust funds.

VI.1.2 New and additional

According to the reporting requirements, Annex II parties shall clarify how they have determined if resources are new and additional. For the purpose of this report, newly committed (for reporting on commitments) or disbursed (for reporting of disbursements) finance for climate change adaptation or mitigation activities within the reporting period and was not reported to UNFCCC in the previous report are considered new and additional. This definition allows a transparent, comprehensive and comparable reporting of climate finance provided to developing countries across the years.

Denmark sees the achievement of climate change and the broader sustainable development goals as closely linked and strongly interdependent, and seeks to identify and support activities in developing countries that address multiple objectives as identified by these countries, including strong co-benefits between climate and broader sustainable development objectives.

VI.2 METHODOLOGY FOR REPORTING

This report (BR3) includes figures on disbursements of climate finance in 2015 and 2016. Information on the disbursements is contained in Chapter VIII as Tables 7, 7(a) and 7(b) of the Common Tabular Format (CTF) also reported electronicly.

Tables on both disbursements and commitments of climate finance for all years 2013-2016 are available in Annex D1 of Denmark's Seventh National Communication.

It is important to note that commitments and disbursements describe two different phases in the deployment of climate finance. Climate finance is committed to a specific project, programme or institution when it is finally approved by the relevant Danish authority and an agreement or similar document signed with the recipient country or organisation. Finance is disbursed when an actual transfer has taken place to an account of the recipient country or organisation. In some cases commitment and disbursement takes place in the same year. In other cases, disbursements will take place over a number of years following the commitment.

Denmark has decided to report financial figures using the same CTF format as in the Third Biennial Report. This makes it possible to compare figures with First Biennial Report (BR1) covering 2011-2012 and Second Biennial Report (BR2) covering 2013-2014. Denmark's method for reporting to the UNFCCC was changed between BR1 and BR2, as BR1 reported on commitments while BR2 reported on disbursements. By providing data on both commitments and disbursements in Annex D1 of Denmark's NC7, it is possible to compare with older reports using both reporting methods.

In the following, the methods behind tracking and reporting bilateral, multilateral and mobilised private climate finance are explained.

VI.2.1 Bilateral climate finance

For bilateral public climate finance, Denmark uses the OECD DAC CRS database with its Rio Markers as basis for reporting on climate change relevant activities. The Rio Markers on adaptation and mitigation are policy markers that indicate policy objectives in relation to each project/programme that is reported to OECD's 'Creditor Reporting System (CRS)'. The markers are assigned based on well-defined guidelines and technical eligibility criteria agreed within OECD DAC.

The guidelines for Rio markers are part of the general 'Official Development Aid' statistics guidelines[25], which provide concrete examples of Rio-marking (Annex 18, Rio Markers). The Rio-marker framework is a useful result of the OECD initiatives to improve/develop the DAC reporting methodology related to transparency on public and private climate finance. Denmark has been an active member of an OECD working group refining and improving the Rio marker system to better serve the purpose of being used as the basis for climate finance reporting to UNFCCC.

Rio markers are applied to all bilateral support to developing countries, except general budget support, imputed student costs, debt relief, administrative costs, development awareness-raising, and refugee reception in donor countries. For a precise definition of OECD DAC Rio markers see the *'Converged Statistical Reporting Directives for the Creditor Reporting System (CRS)'* and *'the Annual DAC Questionnaire'* (including Annex 18 therein).

All Danish support to developing countries is screened and marked with Rio markers to establish whether the project is targeting adaptation and/or mitigation as a "principal objective", a "significant objective" or not targeting. The values of a project are attributed

[25] Converged Statistical Reporting Directives for the Creditor Reporting System (CRS) and the Annual DAC Questionnaire, OECD DAC, DCD/DAC(2016)3/ FINAL (https://www.oecd.org/dac/stats/documentupload/DCDDAC(2016)3FINAL.pdf , https://www.oecd.org/dac/stats/DCD-DAC(2016)3-ADD1-FINAL-ENG.pdf and https://www.oecd.org/dac/stats/DCD-DAC(2016)3-ADD2-FINAL%20-ENG.pdf).

according to the extent to which the themes are explicitly addressed at the level of problem analysis (context); objectives and results; and activities as defined in the eligibility criteria.

The climate relevant contribution of a specific project or programme is quantified based on the adaptation and mitigation markers. If a project or programme is marked with Rio-marker 1 ("Significant") for adaptation and/or mitigation, 50% of the project is reported as climate relevant finance. If a project or programme is marked with Rio-marker 2 ("Principal"), 100% of the budget is reported as climate relevant. In order to avoid double-counting, Denmark ensures that in cases where projects or programmes are marked for both adaptation and mitigation, the total amount of climate relevance finance reported does not exceed the highest marking given.

The types of climate specific support that are reported are “Mitigation”, “Adaptation”, “Cross-cutting” and “Other”. The applied Rio-markers are used to distinguish between the different support types. Contributions relating to programmes, projects and activities that are assigned with a positive Rio-marker for either mitigation or adaptation are reported under the relevant heading. Definitions of mitigation and adaptation are in accordance with the definitions by OECD DAC. Detailed information is provided in Annex 18 of the OECD DAC reporting directives. Mitigation seeks to limit climate change by reducing the emissions of GHGs or by enhancing sink opportunities. Adaptation aims to lessen the adverse impacts of climate change. Contributions to programmes, projects and activities assigned with a positive Rio-marker for both mitigation and adaptation are reported as cross-cutting.

The Danish MFA has put in place a system of external quality assurance of all Rio markers in the project portfolio, which is done before submitting to the OECD CRS database and the use of the database for reporting UNFCCC. Furthermore, the MFA has internally made an effort to further develop its methods and understanding on the handling of reporting to UNFCCC, including by addressing the comments and recommendation by the UNFCCC Expert Review Team to BR2 and NC6. Among the changes and improvements in the methods can be mentioned:

- More detailed information is provided for bilateral climate projects, including information on project titles and identification number in the CRS. This number allows potential users of the report to get more detailed project level information from the open-access OECD DAC CRS database.
- Reporting on multilateral climate-specific funding has been improved to include climate specific funding going through multilateral institutions. Such support to multilateral climate funds is now included as climate-specific finance.
- Analysing the climate part of major Danish public support to major NGO framework programmes.

VI.2.2 Multilateral climate finance

Multilateral climate finance is in the CTF divided into core funding to institutions and climate-specific funding. Core funding is by Denmark identified as funding to selected institutions that are marked as “Core contributions to multilateral institutions" in CRS++ statistical reporting to OECD DAC. Core funding for multilateral institutions is *not* marked with Rio markers in CRS by member states. The numbers reported as core funding to multilateral institutions in CTF Table 7 are the actual amounts of disbursed annual contributions to the organisations.

Many of these institutions track the climate relevant proportion of the projects they support, and report data on these to OECD DAC. It is thus possible to get data on climate-relevant outflows from the main multilateral institutions. But in accordance with the UNFCCC reporting guidelines, Denmark has simply reported its annual core contributions to the organisations, and has not included information on possible climate relevant shares in the CTF table 7. This information is available from the organisations or from OECD DAC.

With regard to CTF Tables 7 and 7(a), Denmark reports on core/general finance and climate-specific finance in a mutually exclusive way:

- Core contributions to '*Multilateral financial institutions, institutions, including regional development banks and 'Specialised United Nations bodies*' are reported as such, including core funding for the World Bank, African Development Bank, Asian Development Bank, UNDP and UNEP. This also includes funding to the Global Environment Facility.

  In addition, Denmark reports on core funding to selected multilateral institutions whose portfolios may include climate related activities, including: CGIAR, the International Fund for Agricultural Development (IFAD), Nordic Development Fund, UN International Strategy for Disaster Reduction, United Nations Industrial Development Organisation and World Food Programme.

- Contributions to '*Multilateral climate change funds*' are reported as climate-specific, including funding to the UNFCCC, the Green Climate Fund, the Least Developed Countries Fund and the Multilateral Fund for the Implementation of the Montreal Protocol.

  In 2015 and 2016, Denmark also reports on climate-specific funding channelled through the Global Green Growth Institute (GGGI), the International Bank for Reconstruction and Development, the Inter-American Development Bank, the International Energy Agency, United Nations Children's Fund (UNICEF), Food and Agricultural Organisation (FAO), United Nations Office for Project Services and through other multilateral organisations. These climate specific contributions are to be distinguished from core contributions to the same organisations that are reported as core contributions as mentioned above.

Climate-specific finance through multilateral institutions is identified, except for the core finance to multilateral climate funds, based on an application of Rio markers, in a method identical to the one used for bilateral climate-specific finance, as also described above. Denmark separates climate-specific bilateral and multilateral funding based on OECD DAC channel codes. The multilateral funds are reported in CTF Table 7(a) and the bilateral funds are reported in CTF Table 7(b).

Reporting on climate finance through core contributions to multilateral organisations is a major challenge for Denmark and other donor countries. Therefore, Denmark values the joint climate finance tracking methodology used by the Multilateral Development Banks (MDBs). Such a methodology is enhancing accountability with regard to climate finance commitments, and to monitor trends and progress in climate related-investment. This is well described in their annual reports ('*Joint Report on Multilateral Development Banks' Climate Finance*'). Denmark will actively engage to seek further improvement of the reporting methodologies for multilateral climate finance flows to allow for better reporting of these to UNFCCC.

VI.2.3 Private climate finance

For the first time, Denmark did in 2015 and 2016 apply Rio markers to private climate finance mobilised by public finance through the Danish development financing institution, the Investment Fund for Developing Countries (IFU). IFU both provides equity capital to climate relevant investments in developing countries using its own resources and it manages a number of investment vehicles that also involves private investors, such as the Danish Climate Investment Fund (DCIF). DCIF may invest in all developing countries offering venture capital and advice to climate investors. The DCIF is an innovative collective investment vehicle that uses public funds provided by the Danish government and IFU to mobilize further financing from Danish pension funds and other private investors have contributed the major part.

IFU submits an annual report to the Danish MFA with information about climate relevant investments, since 2015 including private climate-finance mobilised.

In addition to the support provided by the IFU, Denmark supports private sector climate projects through the Danida Business Finance and Danida Market Development Partnerships. Both programmes provide support to projects focused on sustainable development, including energy efficiency, resource use, environment impacts and climate. A number of climate related activities have been supported, in particular investments in renewable energy.

VI.2.4 Methodological differences from BR2

The methodology used for calculating Danish climate finance for 2015 and 2016 is generally the same as the one that was used in BR2 for 2013 and 2014. Some minor differences are noted between the two reports, specifically:

- Projects receiving a score of “Principal” in one of the Rio markers in pursuit of the UNFCCC, and a score of “Significant” in the other were in BR2 for the years 2013 and 2014 classified as “Cross-cutting”. For the years 2015 and 2016, such projects have been classified as 100% in pursuit of the Rio marker scored as “Principal” (either Mitigation or Adaptation).

- Core funding for all multilateral climate funds were in BR2 for the years 2013 and 2014 reported in the Core/general column in CTF Tables 7 and 7(a). For 2015 and 2016, core finance for all multilateral climate funds other than for the Global Environment Facility, and core finance for the Global Green Growth Institute has been classified as climate-specific.

Core funding is for 2015 and 2016 reported for a number of additional institutions, whose project portfolios may include some amount of climate finance. The institutions for which core finance was not reported in BR2, but is reported for 2015 and 2016 include CGIAR, the International Fund for Agricultural Development (IFAD), the Multilateral Fund for the Implementation of the Montreal Protocol, Nordic Development Fund (NDF), and UN International Strategy for Disaster Reduction (ISDR).

VI.2.5 Final remarks

Denmark provides the information in CTF Tables 7, 7(a) and 7(b) in Danish Kroner and United States Dollars. Denmark is using the currency exchange of the OECD DAC statistical table: Annual Exchange Rates for DAC Countries from 1960 to 2016.

Information on individual Danish development projects is publicly available in Danida's OpenAid database (*http://openaid.um.dk*), where updated disbursements to individual projects and total sums for disbursements to countries, sectors and particular implementing organisations can be found. This testifies to the Danish MFA's implementation of the International Aid Transparency Initiative (IATI).

Denmark, as an EU Member State, also reports under the EU Monitoring Mechanism (MMR), which provides annual reporting of up-to-date information on financial support, capacity building and technology transfer activities to developing countries based on the best data available. This updated reporting mechanism was initiated in 2013. To the extent possible, Denmark follows the recommendations made by the European Commission to allow comparable reporting among Member States of the EU.

VI.3 OVERVIEW OF DANISH CLIMATE FINANCE FROM 2013 TO 2016

This section presents an overview of the Danish climate finance reported to UNFCCC. The overview includes a breakdown by implementation channel (multilateral, bilateral etc.), an overview of recipient countries, mitigation and adaptation shares, bilateral and multilateral channels as well as support to LDC countries.

VI.3.1 Danish climate finance reported 2013 to 2016 - disbursements

In Table VI.1 below there is an overview of Danish climate-specific finance between 2013 and 2016 for disbursements and commitments. Denmark's core contributions to multilateral institutions are not included in Table VI.1 (reported separately under the 'Core/general' column in CTF Table 7 as required by the UNFCCC). The table shows how Danish climate finance disbursements and commitments have been distributed between mitigation, adaptation and cross-cutting based on Rio markers.

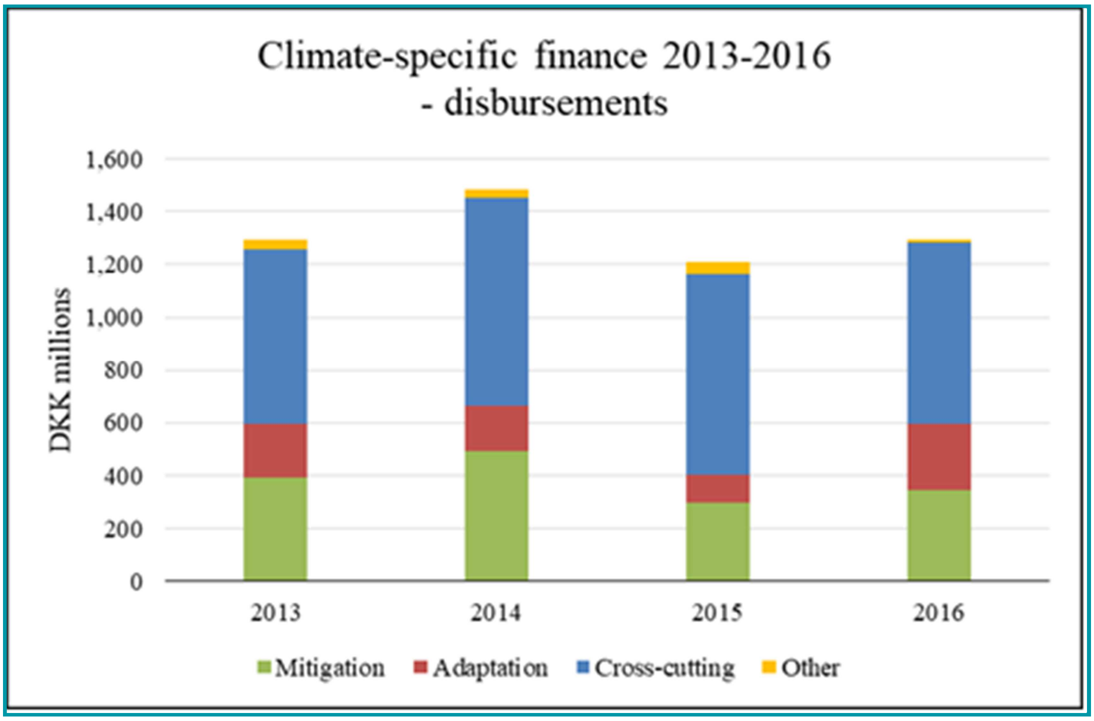
Figure VI.1 shows how Danish climate finance disbursements are distributed between mitigation, adaptation and cross-cutting in the period from 2013 to 2016. The support has, on average, targeted 29% on mitigation, 14% on adaptation and 55% on cross-cutting projects.

It should be noted that commitments may fluctuate significantly from year to year depending on the specific types of commitments made in the specific years. Thus, the commitments were very high in 2013 and 2014 due to a number of multi-year country support programmes being approved these years.

TABLE VI.1: DANISH CLIMATE FINANCE 2013-2016. FIGURES FOR 2013 AND 2014 ARE CALCULATED USING A METHOD SIMILAR TO THE METHOD USED FOR 2015 AND 2016 IN BR3. THESE MIGHT THEREFORE DIFFER FROM FIGURES REPORTED IN BR2.

Danish climate-specific finance (DKK millions)		2013	2014	2015	2016	Average 2013-2016
Commit-ments	Mitigation	229	471	192	259	288
	Adaptation	81	0	89	394	141
	Cross-cutting	1,336	1,257	793	203	897
	Other	0	0	0	2	0
	Total climate-specific	**1,646**	**1,728**	**1,074**	**857**	**1,326**
Disburse-ments	Mitigation	392	492	296	346	382
	Adaptation	202	171	107	248	182
	Cross-cutting	665	788	762	691	726
	Other	33	33	43	7	29
	Total climate-specific	**1,292**	**1,484**	**1,208**	**1,293**	**1,319**

FIGURE VI.1: DISBURSEMENTS OF CLIMATE FINANCE FROM DENMARK BETWEEN 2013 AND 2016. VISUAL REPRESENTATION OF THE NUMBERS FOUND IN TABLE VI.1.



The cross-cutting category can be split equally into mitigation and adaptation with the result shown in Table VI.2[26].

[26] Cross-cutting has been divided evenly between mitigation and adaptation. This has been done based on all projects included in the category having the same Rio marker in mitigation and adaptation (either Significant in both or Principal in both objectives).

TABLE VI.2: DANISH CLIMATE FINANCE 2013-2016. AS TABLE 7.1 BUT WITH THE CROSS-CUTTING CATEGORY EQUALLY SPLIT INTO MITIGATION AND ADAPTATION.

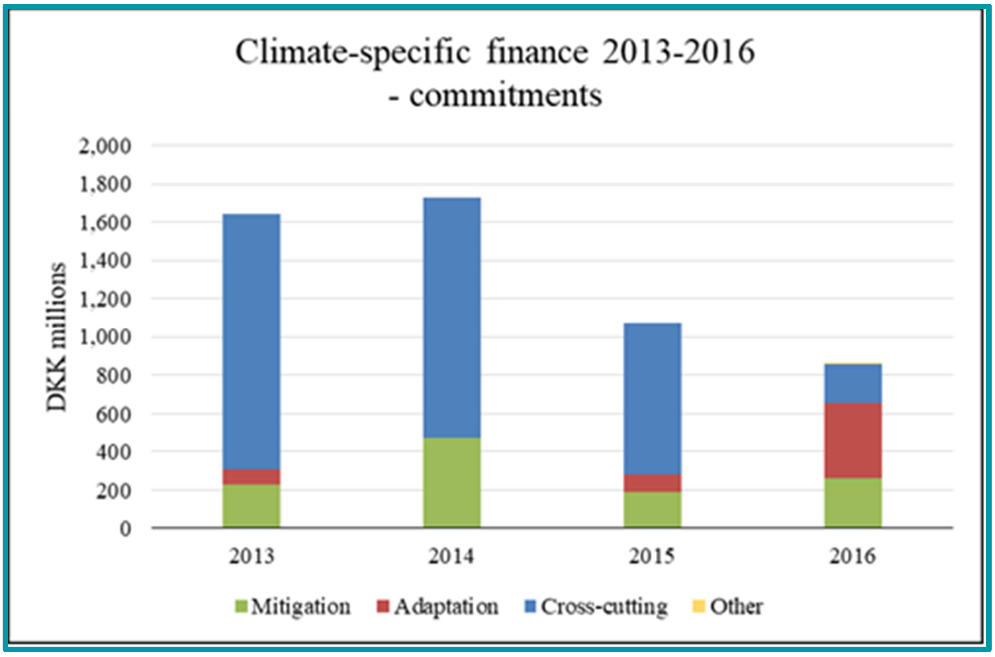
Danish climate-specific finance (DKK millions) *Cross-cutting split between mitigation and adaptation*		**2013**	**2014**	**2015**	**2016**	**Average 2013-2016**
Commit-ments	Mitigation	897	1,099	589	360	736
	Adaptation	749	629	486	495	590
	Other	0	0	0	2	0
	Total climate-specific	**1,646**	**1,728**	**1,074**	**857**	**1,326**
Disburse-ments	Mitigation	724	886	677	692	745
	Adaptation	535	565	487	594	545
	Other	33	33	43	7	29
	Total climate-specific	**1,292**	**1,484**	**1,208**	**1,293**	**1,319**

With this method, Danish climate finance disbursements in the period from 2013 to 2016 has, on average, spent 56% on mitigation and 41% on adaptation.

VI.3.2 Danish Climate Finance Reported to the UNFCCC (2013 to 2016) - commitments

Figure VI.2 shows Danish climate finance commitments between 2013 and 2016. On average, Denmark has committed DKK 1.33 billion annually, amounting to 8% of total Danish ODA commitments.

FIGURE VI2: COMMITMENTS OF CLIMATE FINANCE FROM DENMARK BETWEEN 2013 AND 2016. VISUAL REPRESENTATION OF THE NUMBERS FOUND IN TABLE VI.2.



VI.3.3 Danish climate finance to multilaterals channels (2013 to 2016)

Core funding to multilateral institutions is reported separately under the 'Core/general' column in Table 7 as required by the UNFCCC reporting guidelines. These core contributions are not included in the summary tables above.

Many multilateral institutions annually report their climate-relevant outflows to OECD, and the percentage of their total portfolios that can be considered as climate-relevant financing. Based on this information it is possible to estimate the so-called imputed shares of the core contributions to these multilaterals that may be considered as climate relevant.

Table 7.3 below provides an overview of Danish core contributions (disbursements) to a range of multilateral institutions and the corresponding imputed climate relevant shares[27].

TABLE VI.3: BREAKDOWN OF MULTILATERAL CORE FUNDING BETWEEN 2013 AND 2016 INCLUDED IN THE DANISH REPORTING TO THE UNFCCC AND THE CORRESPONDING CLIMATE RELEVANT PART OF THESE CONTRIBUTIONS CALCULATED BASED ON THE OECD IMPUTED SHARE METHOD . FIGURES FOR 2013 AND 2014 ARE CALCULATED USING A METHOD SIMILAR TO THE METHOD USED FOR 2015 AND 2016 IN BR3. THESE MIGHT THEREFORE DIFFER FROM FIGURES REPORTED IN BR2*.

Core funding to multilateral institutions **Imputed method** (DKK million - **Disbursements**)	**2013**		**2014**		**2015**		**2016**	
	Core contribution reported	Imputed climate relevant share	Core contribution reported	Imputed Climate relevant share	Core contribution reported	Imputed climate relevant share	Core contribution reported	Imputed climate relevant share
Multilateral climate change funds	157	*127*	242	*202*	200	*170*	194	*165*
Multilateral financial institutions	936	*196*	629	*134*	1,034	*205*	1,107	*209*
Specialised United Nations bodies	552	*0*	625	*20*	619	*20*	434	*0*
Total	**1,645**	***323***	**1,495**	***355***	**1,853**	***395***	**1,736**	***374***

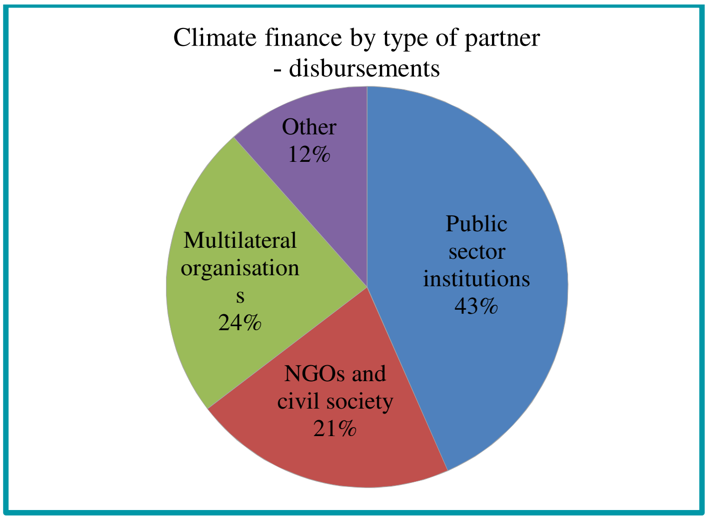
VI.3.4 Climate Finance by type of partner

Figure VI.3 below illustrates the breakdown of Danish climate finance by type of direct partner. The categories are based on information available in CRS, and include climate specific contributions channelled through multilateral institutions bilateral grants to government institutions in partner countries, and NGO-managed funds. It does, however, not include core contributions to multilateral organisations neither in full nor as imputed climate-relevant shares.

As shown in Figure VI.3, bilateral public sector institutions (43%) are the primary partners for Danish climate finance, accounting for about twice as much of the climate finance as multilateral organisations (24%) and NGOs (21%).

[27] It is noted that to simplify the calculation of imputed multilateral contributions, one standard rate of climate share for each institution has been used (2014-2015 average, available from OECD *http://www.oecd.org/dac/stats/climate-change.htm*).

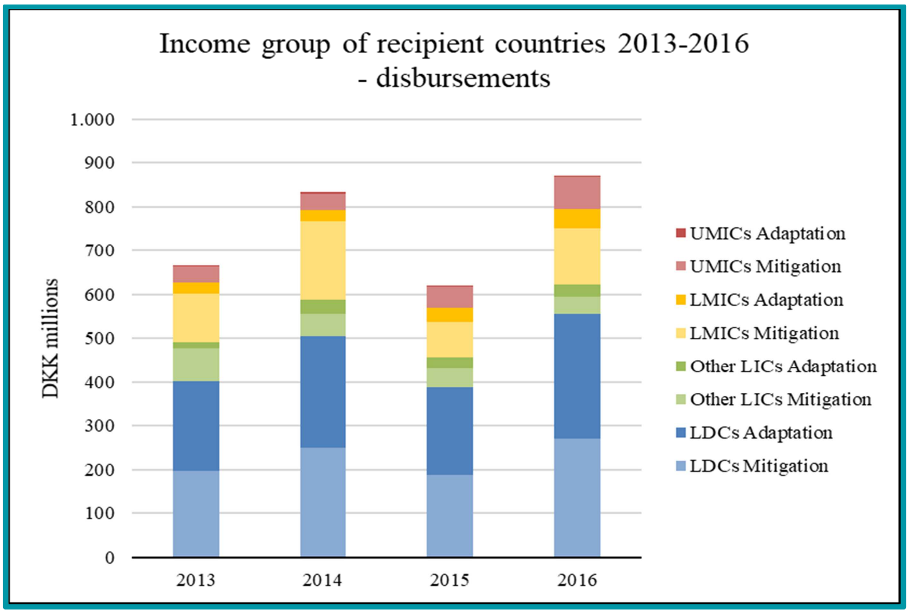
FIGURE VI.3: DANISH CLIMATE FINANCE DISBURSEMENTS 2013-2016 BY TYPE OF PARTNERS. CONTRIBUTION TO MULTILATERAL CORE FUNDING IS NOT INCLUDED.



VI.3.5 Breakdown by Income Groups and Danida Priority Countries

Based on the project information available in OECD CRS, it is possible to categorise Danish climate finance according to recipient country income groups. This is illustrated in Figure VI.4, which shows how Danish climate finance disbursed between 2013 and 2016 is distributed between income groups used by the OECD-DAC (LDC: Least Developed Countries; Other LICs: Other Low Income Countries; LMICs: Lower Middle Income Countries; and UMICs: Upper Middle Income Countries). The figure excludes the 51% of funding categorised as "*Unallocated*" (e.g. spent by means of framework agreements with NGOs or universities or programmes and contributions to multilateral organisations or targeting multiple countries).

FIGURE VI.4: BILATERAL COUNTRY SPECIFIC DANISH CLIMATE FINANCE DISBURSEMENTS 2013-2016 DISTRIBUTED BETWEEN DIFFERENT INCOME GROUPS OF RECIPIENT COUNTRIES.



* Cross-cutting climate finance has in the figure been divided evenly between adaptation and mitigation.

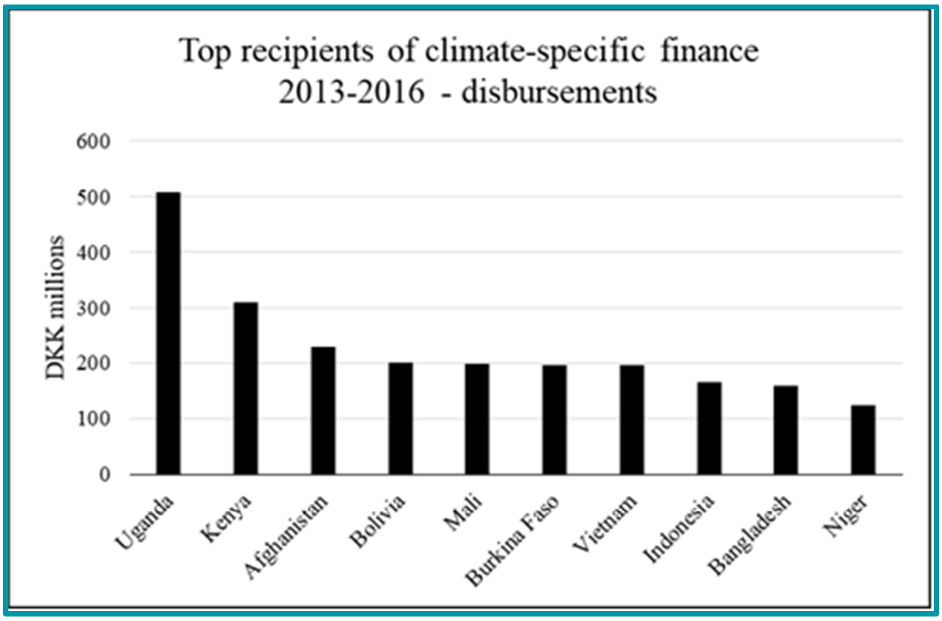
The least developed countries, LDCs, received more than 60% of bilateral country specific-climate finance from Denmark between 2013 and 2016.

Between 2013 and 2016, the climate finance to LDCs was evenly distributed between adaptation and mitigation while climate finance to middle income countries has a stronger focus on mitigation.

VI.3.6 Allocation of Climate Finance to Danida Priority Countries

Figure VI.5 below shows disbursements of Danish climate finance between 2013 and 2016, to the top ten recipients. As indicated in Figure VI.5, the amount of climate finance varies a lot between the countries, but countries in South Asia, Southeast Asia and Africa are well represented.

FIGURE VI.5: TOP TEN RECIPIENT COUNTRIES OF CLIMATE FINANCE DISBURSEMENTS FROM DENMARK BETWEEN 2013 AND 2016.



VI.4 TECHNOLOGY TRANSFER AND BUILDING CAPACITY

VI.4.1 Introduction

Denmark does not have a dedicated system for tracking capacity building and technology transfer elements of its climate relevant support to developing countries. However, most climate support does have a capacity element and many projects and programmes also have elements of technology transfer.

The projects mentioned below are examples of how Denmark is practicing an integrated approach to capacity building and technology transfer as part of its overall climate support portfolio.

Danish support to capacity building in relation to implementation of the UNFCCC includes a broad spectrum of activities as capacity building activities are integral parts of most project activities. Denmark aims to ensure that 'capacity building support' provided to non-Annex I Parties reflects their priorities and needs through effective development cooperation.

Danish support to technology transfer comprises transfer of both “soft” and “hard” technology. The extent of this technology transfer is significant and cannot be clearly separated from other activities in Danish development cooperation, as well as there is often an unclear distinction between transfer of "soft" and "hard" technology. Examples of Danish-supported bilateral activities leading to technology transfer are e.g. the Danida Business Finance programme or the Danish sector programme supporting the energy sector. In the next section a number of concrete programmes are presented.

An overview of selected projects is set out in CTF Tables 8 and 9 in relation to country level ‘technology development and transfer support’ and ‘capacity building support’ (see Chapter VIII).

In Annex D2 of Denmark’s NC7, descriptions in tabular format of a few selected programmes/projects to advance and/or finance transfer of technologies to other countries are given.

VI.4.2 Examples of projects with technology and capacity building

VI.4.2.1 Climate Change Adaptation Project in Bangladesh

Denmark supports a number of climate change adaptation projects in Bangladesh focusing on adaptation of rural infrastructure to the impacts of climate change. The support includes piloting local level participatory adaptation planning and construction of more climate resilient local infrastructure in the fragile coastal zone. Another project supports upgrading, constructing and maintaining of climate resilient and sustainable rural roads connecting cyclone shelters also in the coastal zone. This project aims at building capacity and test new methods and ideas for more general uptake by the Local Government Engineering Department.

VI.4.2.2 Energy efficiency in industry in Bangladesh

Through the Nordic Chamber of Commerce and Industry Denmark has supported piloting of energy efficiency audits and implementation of energy efficiency measures and technologies in a number of private sector companies in various sectors. The project has built capacity among private energy auditors and strengthened the local market for their services. Further, it has supported capacity building and training of energy managers and piloting of the introduction of energy saving technologies and processes in more than 50 companies.

VI.4.2.3 Least Developed Countries Fund

Denmark has supported the Least Developed Countries Fund (LDCF) since it was conceived. The LDCF is a key mechanism for supporting, in particular, LDCs efforts to initiate national adaptation planning and implementation as an integrated part of the national, sectoral and local level development planning. Capacity building of national and local authorities is an important element of the support provided by the LDCF financed projects, including the support to introducing good practices and relevant climate-smart technologies.

VI.4.2.4 Adaptation and building climate change resilience in Mozambique

Denmark has supported programmes for adaptation and building climate change resilience in Mozambique (between 2011 and 2016) in collaboration with the central government, municipalities, and civil society organisations. It strengthens the capacity of the partners to coordinate and carry out their normative mandates and mainstreams climate relevant activities in other sectors at provincial and municipal level.

At municipal level the support has included strengthening the capacities of the country's new municipalities for addressing management, investments, urban planning and environment. That includes climate change resilience and mainstreaming of climate change concerns into all relevant aspects of municipal planning and development. Building municipal climate change resilience is critical in Mozambique, given the projected human and economic losses due to unaddressed effects of climate change within urban areas, and the accelerating rate of urbanisation.

VI.4.2.5 Greening of Agricultural Transformation in Ethiopia (GATE) thematic programme

Denmark supports the thematic programme 'Greening of Agricultural Transformation in Ethiopia (GATE)' with its first phase 2014-2017. The programme is designed to i) accelerate a "green" transformation of the agricultural sector with a focus on the Ethiopian small-holder farmers and ii) gather speed to the mainstreaming and implementation of Ethiopian climate resilient green economy initiatives within agriculture and forestry.

The project works through an autonomous entity accountable to the Ministry of Agriculture, the Agricultural Transformation Agency that addresses the need for improving the understanding of and building of capacity to mainstream Climate Smart Agriculture across sectors. The focus is directed towards leaders in relevant ministries, departments, and regions as well as civil society and the private sector.

VI.4.2.6 The Climate Technology Centre and Network (CTCN)

The Danish government supports, the Climate Technology Centre and Network (CTCN).The CTCN assists developing country Parties at their request, building or strengthening their capacity to prepare and implement technology projects that span the technology transfer continuum. The CTCN supports public and private sector action on mitigation and adaptation, enhancing low emissions and climate-resilient development in a manner consistent with the capabilities and priorities of countries. CTCN is active in the Paris Committee on Capacity Building, sharing experience in developing in-country capacity and operating the web portal, www.ctc-n.org that provide access to over 14,600 curated technology publications, webinars and case studies. The Centre hosts an innovation-focused meeting of the global research and development community, and cooperates with the GCF to advance solutions that address challenges early in the technology cycle.

VI.4.2.7 UNEP-DTU partnership

The UNEP DTU Partnership (UDP) is an international research and advisory institution on energy, climate and sustainable development that has received Danish Government core funding since it was established in 1990. The UDP supports UN Environment in facilitating a shift towards cleaner and more efficient energy systems and support more climate resilient sustainable development in developing countries through internationally leading research, policy analysis and capacity development. As a UN Environment Collaborating Centre, UDP specifically supports the planning and implementation of UN Environment's Programme of Work and Medium Term Strategy. The Copenhagen Centre on Energy Efficiency, which is one of the thematic programmes within UDP, also functions as an Energy Efficiency-Hub for SEforALL.

Focus in all UDPs activities is on capacity building and technology transfer, and includes;

- Technology Transfer Partnerships for SDG and Climate Action,
- Strengthening markets and value chains for renewable energy in NDCs,
- Scalable and replicable models for private sector adaptation and mitigation action,
- Transparency of NDC and SDG actions, and
- Emissions and adaptation gap reports.

VI.4.2.8 Promotion of Sustainable Natural Resource Management & Climate Change in Bolivia

The programme supports: i) Improved forest management and livelihood in national parks and forestry areas, ii) Improved energy efficiency, use of renewable energy and cleaner technologies and iii) Climate change mitigation and adaptation. The programme supports capacity building among local level actors and institutions on territorial planning and sustainable production of forest products for indigenous peoples contributing to climate change mitigation and ecosystems preservation. Further, the programme supports capacity building and technology transfer in energy efficiency and renewable energy. The later has included the construction fo a large scale wind-farm connected to the grid.

Finally, the programme has supported Bolivia in developing its Joint Mechanism of Mitigation and Adaptation for the Integral and Sustainable Management of Forests and Mother Earth.

VI.4.2.9 Promotion of green technologies in Strategic Sector Cooperation with Kenya

Danida has supported management and reforms of Kenya's natural capital base especially in the sectors of water, environment and agriculture since the early days of engagement with Kenya. Partnering directly with the Government, this support has brought forward development of relevant sectoral policies, institutional and capacity building, in addition to facilitating community-driven environmental management and advocacy initiatives. The programme has supported the demand from community level for technical services from both public and private service providers. Further, Danida has supported the development of Kenya's National Climate Change Action Plan (2013-2017) and activities to enhance private sector and community engagement in climate interventions through the use of technology innovation to reduce vulnerability to climate change and contribute to a low carbon development path.

Furthermore, Denmark has since 2012 supported "Improving Community Resilience and Rangeland Management (Northern Rangelands Trust – NRT). This programme seeks to enhance pastoral livelihoods in the harsh ASAL (arid and semi-arid lands) in Northern Kenya. It addressed the key challenges that undermine the resilience of marginalised and vulnerable communities in this region created by lack of water and pastureland. The programme strengthens capacities to manage under the land use of pastoralism and wildlife conservation, diversifies livelihoods by creating new enterprises, establishes lasting peace and security among Northern Kenya communities and contributes to the long-neglected human capacity development by investing in health, education and water infrastructure. Lastly, the programme has supported the introduction and acquisition of additional weather monitoring technologies and equipment to enhance the provision of accurate weather and climate information to various end-users, and thereby enabling knowledge based decision-making.

VI.4.2.10 Assist countries with energy planning and transition to renewable energy

The Danish Energy Agency cooperates with the governments of a number of developing countries on capacity building and technology transfer related to sector energy transition to become a low-carbon economy. The cooperation is primarily focusing on policy improvements in long term energy planning and modeling, renewable energy integration and deployment, energy efficiency interventions and in climate change mitigation, and preparation of specific investments in renewable energy projects and technology transfer.

- Denmark and Ethiopia cooperates on expanding Ethiopian wind power. The Danish Energy Agency is among the Danish authorities who contribute Ethiopia's ability to utilise its huge wind potential, providing technical assistance and experiences from Denmark as well best practice internationally.
- China and Denmark cooperates on transition to a low-carbon economy that proved it possible to reduce emissions and maintaining economic growth.
- Support is provided to Mexico for implementing its climate change strategy and action plans, helping to improve Mexico's frameworks for introducing renewable energy and energy efficiency interventions.
- Assistance is provided to South Africa for transforming its energy sector away from coal. The focus is on mitigating carbon emissions, increasing energy efficiency and improving conditions for renewable energy into the country's energy mix.
- Denmark is supporting Vietnam in order to improve the Vietnamese energy efficiency and increase use of renewable energy, and investing in low emission technologies in SMEs.
- In 2015 the Ukrainian-Danish Energy Centre opened in Kiev. Here Denmark supports the Ukrainian authorities in building capacity for the implementation of Ukraine's long term energy strategy and planning.
- The Danish Energy Agency is supporting Turkey in meeting its long-term objectives for renewable energy, energy efficiency and district heating. It is also assisting with the research and innovation agendas related to these sectors.
- Indonesia with a programme focusing on energy planning, integrating renewable energy into the energy mix and increasing energy efficiency.

In the period 2012-2016 the cooperation was carried out through the Low Carbon Transition Unit (LCTU) based at the Danish Energy Agency under the Ministry of Climate, Energy and Building. In 2017, the LCTU was replaced by the Danish Energy Agency's Energy Partnership Programme (DEPP).

The DEPP consists of experts within the fields of energy efficiency, renewable energy, mitigation analysis as well as international greenhouse gas emission baselines. The DEPP gives high quality technical government-to-government guidance to help developing countries and emerging economies with greenhouse gas emission reductions and low carbon transition in the energy sector. The DEPP works both with countries regarding general and methodological issues relevant to greenhouse gas emission reductions as well as with specific energy-related capacity building and technology transfer in selected emerging economies as described above.

Annex D3 in Denmark's Seventh National Communication contains further information about the DEPP.

VI.4.2.11 Supporting the Indonesian Energy Transition

The Danish Energy Agency assists Indonesia reducing emission through a three-year strategic partnership programme focusing on energy planning, integrating renewable energy into the energy mix and increasing energy efficiency. This is part of a Danish supported Strategic Sector Cooperation programme, which facilitates government-to-government collaboration in areas where Denmark has decades of experience, which is valuable to rapidly emerging economies.

The cooperation operates on both technical and institutional level, and the main outcome of the SSC-programme is the support to improved modeling and energy planning, extended integration of renewable energy in the energy system and the reduction of the energy demand through energy efficiency measures. That includes the development of the Indonesian National Master Plan on Energy Efficiency and transferring Danish experiences and technology with energy efficiency to the industrial sector. It also includes capacity building within integration of fluctuating renewable energy into the energy mix and to prepare a set of guidelines on the assessment of wind power projects.

VI.4.2.12 Ssupport to sustainable energy systems

Denmark is a long-time supporter of the Energy Sector Management Assistance Programme (ESMAP), an assistance programme administered by the World Bank (WB). ESMAP provides analytical advisory services to low- and middle-income countries to reduce poverty and boost growth, through environmentally sustainable energy solutions. ESMAP builds capacity in client countries through targeted technical assistance, knowledge generation and dissemination, pre-investment project preparation, and implementation support. ESMAP tackles questions related to energy in all its forms in both rural and urban settings. It influences billions in loans for development projects, leverages public and private financing, working with global agendas on energy and climate in country partnership programs and beyond. Practically, ESMAP works in every WB client country supporting improved energy sector performance and governance, enhancing access to modern energy services and technology, increasing the efficiency of energy use, and/or promoting renewable energy.

VI.5 MOBILISED PRIVATE SECTOR CLIMATE INVESTMENTS THROUGH IFU

Denmark has made significant efforts to establish new and innovative instruments to mobilise private finance for climate relevant investments in developing countries. The main bilateral vehicle for these efforts has been the Danish development financing institution IFU (Investeringsfonden for Udviklingslande or Danish Investment Fund for Developing Countries).

Table 7.4 below shows the amount of private sector investments mobilised through projects that are co-financed by public resources from IFU and the Danish MFA:

In 2016: DKK 1,487,055 private investments mobilised.

In 2015: DKK 1,297,214 private investments mobilised.

The Danish Climate Investment Fund (DCIF) is involved in 11 of 16 investment projects in 2015-2016 listed in Table 7.4.

TABLE 7.4: AN OVERVIEW OF SPENDING AS REPORTED BY IFU TO DANISH MFA*.

Approved projects in 2016 Danish Investment Fund (IFU)					
Exten-ding agency	Beneficiary country	Public financed commitment 1.000 DKK	Amount mobilised from the private sector	Mitiga-tion Rio marker	Adapta-tion: Rio marker
DCIF	India	15.800	66.841	2	0
IFU	Guatemala	3.000	5.021	2	0
DCIF	China	66.800	774.900	2	0
DCIF	Ukraine	78.100	20.293	2	0
IFU	Turkey	111.600	148.400	2	0
IFU	China	9.900	400.200	2	0
DCIF	DAC	13.700	33.300	2	0
DCIF	Brazil	5.400	38.100	2	0
DCIF	Brazil	7.000	-	2	0
		311.300	1.487.055		

Approved projects in 2015 Danish Investment Fund (IFU)					
Extending agency	Beneficiary country	Public financed commitment 1.000 DKK	Amount mobilised from the private sector	Mitiga-tion Rio marker	Adapta-tion: Rio marker
IFU	China	2.600	5.322	1	0
IFU	China	5.300	2.588	1	0
DCIF	India	52.200	127.000	1	0
DCIF	Malaysia	-	11.904	1	0
DCIF	Chile	-	51.800	1	0
DCIF	Chile	-	126.500	1	0
DCIF	Chile	-	972.100	1	0
					0
		60.100	1.297.214		

* When zero self-financing has been reported for the four investments channeled through DCIF in 2015, this is because the capital, including the private capital, from the fund itself was invested in 2014, and has hence not been included again in 2015 (to avoid double counting).

This fund is a public-private partnership managed by IFU. DCIF has raised EUR 174 million of public and private funds (until 2016) to the fund itself that is mobilising further private investments at the project level. The public funds have been provided by the Danish government and the IFU, while Danish pension funds have contributed the major part (EUR 104 million). The fund mobilises further project finance by partnering up with private co-investors, who must contribute the bulk of funds. It is estimated that the fund will generate total investments of EUR 1-1.2 billion. The fund has the opportunity to invest in all developing countries by offering venture capital and advice to climate investors.

The amounts of private finance mobilised have been calculated on the time of IFU/DCIF declaring their commitments and is expressing the level expected after the investments have been carried out.

VII. Other reporting matters

A. Denmark

The Danish government is continuously assessing historical and projected progress in Denmark's contribution to the joint EU28 economy-wide emission reduction target described in section III of this biennial report.

The latest assessment is contained in the report "Denmark's Energy and Climate Outlook 2017" (Danish Energy Agency, March 2017)[28]

Furthermore, in accordance with EU legislation[29], Denmark has in place a national system for reporting on policies and measures and for reporting on projections of anthropogenic greenhouse gas emissions by sources and removals by sinks.

This national system includes the relevant institutional, legal and procedural arrangements established in Denmark for evaluating policy and making projections of anthropogenic greenhouse gas emissions by sources and removals by sinks.

These domestic arrangements are considered to be sufficient for the process of the self-assessment of compliance with emission reductions in comparison with emission reduction commitments and the level of emission reduction recommended by science.

Denmark has established national rules for taking action against Danish entities under the EU ETS in case of non-compliance with their emission reduction targets under the EU ETS. These rules are contained in the Danish Act on CO_2 quotas (the Act of 9 May 2008 with amendments for the period 2008-2012[30] and the Act of 28 November 2012 for the period 2013-2020[31] as amended[32]).

As only Denmark's greenhouse gas emissions (i.e. without Greenland's and the Faroe Islands' greenhouse gas emissions) are relevant in relation to Denmark's contribution to the EU's greenhouse gas emissions (Greenland and the Faroe Islands are not EU territories) and therefore also the only emissions relevant in relation to the assessment of progress towards the joint EU target for 2020 under the convention as described in Chapter III, summary tables from Denmark's greenhouse gas inventory only (i.e. without Greenland and Faore Islands) are in Table 1 of the CTF (see Chapter VIII).

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[28] https://ens.dk/sites/ens.dk/files/Analyser/denmarks_energy_and_climate_outlook_2017.pdf and https://ens.dk/sites/ens.dk/files/Analyser/memo_on_new_estimate_of_non-ets_deficit_for_the_period_2021_to_2030.pdf

[29] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:165:0013:0040:EN:PDF

[30] https://www.retsinformation.dk/Forms/R0710.aspx?id=117147

[31] https://www.retsinformation.dk/Forms/R0710.aspx?id=144102

[32] https://www.retsinformation.dk/Forms/R0710.aspx?id=167235 and https://www.retsinformation.dk/Forms/R0710.aspx?id=185713

B. GREENLAND

Information on greenhouse gas emissions and trends

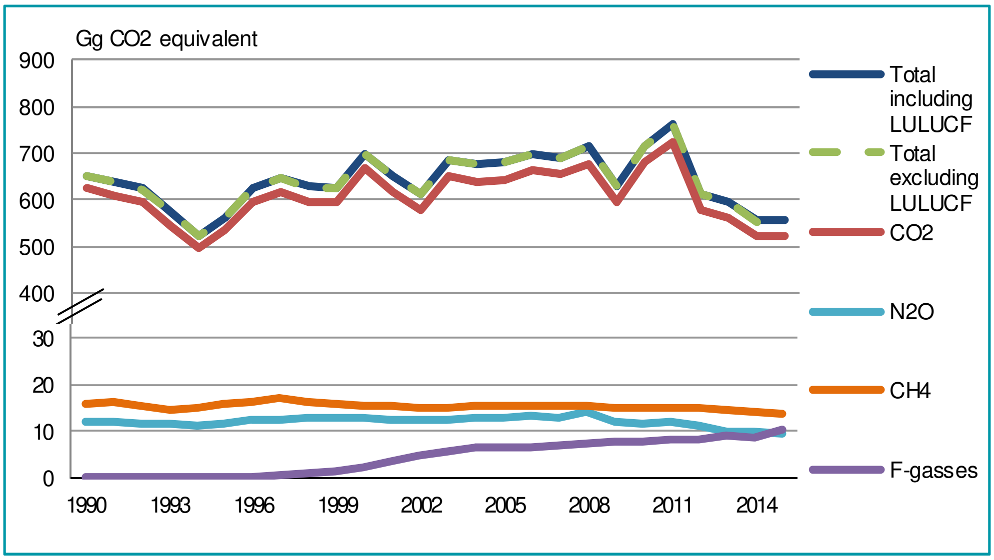
Summary information from Greenland's greenhouse gas inventory on emissions and emission trends

In 2015, the total emission of greenhouse gases excluding LULUCF was 557.41 kt CO_2 equivalent, and 558.46 kt CO_2 equivalent including LULUCF.

Figure VII.B.1 shows the total greenhouse gas emissions in CO_2 equivalents from 1990 to 2015. The emissions have not been corrected for temperature variations. CO_2 is the most important greenhouse gas. In 2015, CO_2 contributed to the total emission in CO_2 equivalent excluding LULUCF with 94.0 %, followed by CH_4 with 2.5 %, N_2O with 1.7 % and F-gases (HFCs and SF_6) with 1.8 %. Since 1990, these percentages have been increasing for F-gases, and falling for CO_2 and N_2O, and stable for and CH_4. Greenland has no consumption of PFC.

***Figure VII.B.1** Greenhouse gas emissions in CO_2 equivalents, time-series 1990-2014.*

Source: Greenland's Ministry of Labour, Trade, Industry and Energy, 2017.

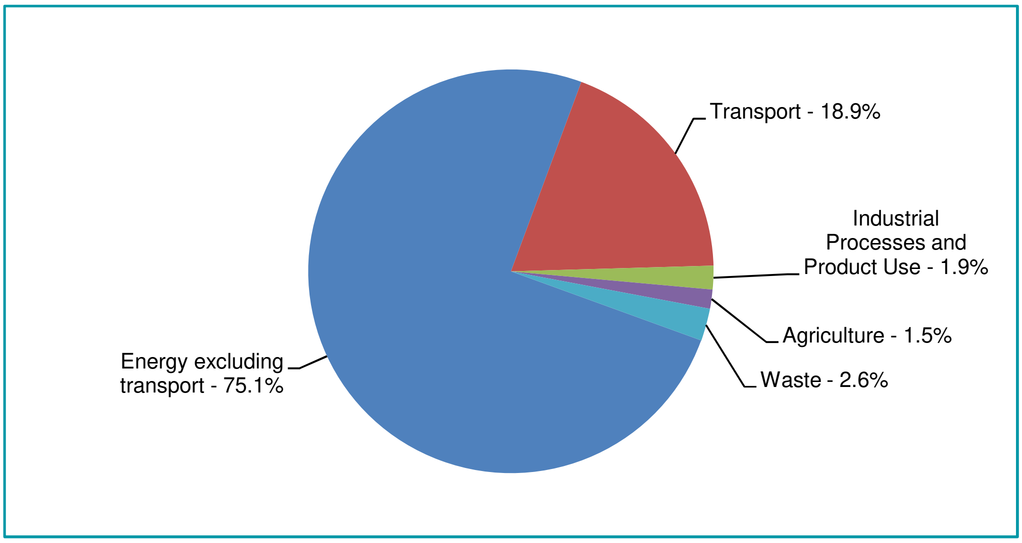


Stationary combustion plants and transport represent the largest categories. In 2015, energy excluding transport accounted for 75.1 % of the total emission in CO_2 equivalents excluding LULUCF; see Figure VII.B.2. Transport contributed with 18.9 %. Industrial processes and product use, agriculture and waste contributed to the total emission in CO_2 equivalents with 6.0 %.

The net CO_2 emission from forestry etc. was 0.2 % of the total emission in CO_2 equivalents in 2015. Total GHG emissions in CO_2 equivalents excluding LULUCF have decreased by 14.6 % from 1990 to 2015 and decreased 14.4% including LULUCF.

Figure VII.B.2 *Greenhouse gas emissions in CO_2 equivalents distributed on main sectors for 2015.*

Source: Greenland's Ministry of Labour, Trade, Industry and Energy, 2017.



The summary tables from Greenland's greenhouse gas inventory are shown in Table VII.B.1 below (similar to the format of table 1 of the CTF).

Table VII.B.1: *Emission trends (SUMMARY), Greenland (i.e. not EU territory)*

CTF: Table 1

Emission trends: summary

CRF: TABLE 10 EMISSION TRENDS SUMMARY (Sheet 6 of 6)

Inventory 2015
Submission 2017 v1
GREENLAND

Greenland

GREENHOUSE GAS EMISSIONS	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO_2 equivalent (kt)																											(%)
CO_2 emissions without net CO_2 from LULUCF	624	624	610	596	546	496	534	597	618	597	595	667	618	580	650	640	644	662	653	678	593	679	725	579	561	521	524	-16.11
CO_2 emissions with net CO_2 from LULUCF	625	625	610	596	546	496	535	597	618	597	595	668	619	580	651	641	645	663	654	679	593	680	727	580	562	522	525	-15.97
CH_4 emissions without CH_4 from LULUCF	16	16	16	15	15	15	16	16	17	16	16	15	15	15	15	15	16	15	15	15	15	15	15	15	15	14	14	-13.50
CH_4 emissions with CH_4 from LULUCF	16	16	16	15	15	15	16	16	17	16	16	15	15	15	15	15	16	15	15	15	15	15	15	15	15	14	14	-13.50
N_2O emissions without N_2O from LULUCF	12	12	12	12	11	11	12	12	12	13	13	13	13	12	13	13	13	13	13	14	12	12	12	11	10	10	9	-20.60
N_2O emissions with N_2O from LULUCF	12	12	12	12	11	11	12	12	12	13	13	13	13	12	13	13	13	13	13	14	12	12	12	11	10	10	9	-20.60
HFCs	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	1	1	2	3	5	6	6	6	6	7	7	8	8	8	8	9	9	10	100.00
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
SF_6	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Total (without LULUCF)	652	652	638	623	572	522	562	626	647	627	624	698	649	612	683	674	679	697	688	715	627	714	761	613	595	553	557	-14.57
Total (with LULUCF)	653	653	638	623	572	523	562	626	648	627	625	698	650	612	684	675	680	698	689	716	627	715	762	614	596	555	558	-14.44
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO_2 equivalent (kt)																											(%)
1. Energy	625	625	610	596	546	496	534	597	618	597	594	668	618	580	650	641	645	663	654	679	593	680	726	579	562	521	524	-16.19
2. Industrial processes and product use	0	0	0	0	0	0	0	0	1	1	2	2	4	5	6	7	7	7	7	8	8	8	9	9	9	9	10	3329.22
3. Agriculture	10	10	10	9	8	8	9	10	10	10	10	9	9	9	9	10	10	10	10	10	9	10	10	9	9	9	9	-10.17
4. Land use, land-use change and forestry[(5)]	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	406.18
5. Waste	17	17	18	18	18	18	18	18	19	19	19	18	18	18	18	18	18	18	18	18	16	16	16	16	15	15	14	-17.49
6. Other																												
Total (including LULUCF)[(5)]	653	653	638	623	572	523	562	626	648	627	625	698	650	612	684	675	680	698	689	716	627	715	762	614	596	555	558	-14.44

Table VII.B.1: *Emission trends (GHGs), Greenland (i.e. not EU territory)*

CTF: Table 1
(cont.) Emission trends (GHG)
CRF: TABLE 10 EMISSION TRENDS Inventory 2015
GHG CO_2 eq emissions Submission 2017 v1
(Sheet 1 of 6) GREENLAND
Greenland

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt CO_2 eq)																											%
Total (net emissions)[2]	653	653	638	623	572	523	562	626	648	627	625	698	650	612	684	675	680	698	689	716	627	715	762	614	596	555	558	-14.44
1. Energy	625	625	610	596	546	496	534	597	618	597	594	668	618	580	650	641	645	663	654	679	593	680	726	579	562	521	524	-16.19
A. Fuel combustion (sectoral approach)	625	625	610	596	546	496	534	597	618	597	594	668	618	580	650	641	645	663	654	679	593	680	726	579	562	521	524	-16.19
1. Energy industries	183	183	178	173	157	140	121	122	129	127	129	133	134	135	135	139	138	143	136	145	127	228	253	111	95	97	111	-39.39
2. Manufacturing industries and construction	27	27	26	25	23	20	44	45	46	40	46	48	46	43	50	51	55	56	58	60	43	39	47	37	39	25	24	-11.45
3. Transport	97	97	97	95	88	82	90	94	98	102	106	107	97	94	103	115	113	123	112	119	107	110	117	112	112	106	105	8.47
4. Other sectors	310	310	302	295	271	247	273	330	338	320	307	373	335	302	356	328	331	332	341	346	300	279	287	303	311	291	274	-11.57
5. Other	8	8	8	8	7	6	7	7	7	7	7	7	7	7	7	8	7	10	8	10	16	24	21	16	5	2	10	18.46
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Industrial Processes	0	0	0	0	0	0	0	0	1	1	2	2	4	5	6	7	7	7	7	8	8	8	9	9	9	9	10	3329.22
A. Mineral industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.29
E. Electronic industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Product uses as ODS substitutes	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	1	1	2	3	5	6	6	6	6	7	7	8	8	8	8	9	9	10	100.00
G. Other product manufacture and use	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	10	10	10	9	8	8	9	10	10	10	10	9	9	9	9	10	10	10	10	10	9	10	10	9	9	9	9	-10.17
A. Enteric fermentation	8	8	8	7	6	7	7	7	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	-20.13
B. Manure management	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-15.29
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	2	2	1	2	2	1	2	2	2	2	2	86.98
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Liming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-50.00
H. Urea application	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
I. Other carbon-containing fertilizers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
J. Other																												
4. Land use, land-use change and forestry[2]	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	406.18
A. Forest land	NO,IE	NO,IE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
C. Grassland	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	407.43
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
H. Other																												
5. Waste	17	17	18	18	18	18	18	18	19	19	19	18	18	18	18	18	18	18	18	18	16	16	16	16	15	15	14	-17.49
A. Solid waste disposal	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5.45
B. Biological treatment of solid waste	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Incineration and open burning of waste	6	6	6	6	6	6	6	6	7	7	7	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	-6.38
D. Waste water treatment and discharge	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	6	6	6	6	5	4	4	-40.65
E. Other																												
6. Other *(as specified in summary 1.A)*																												
Memo items:																												
International bunkers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	42	35	21	32	45	36	125	148	70	50	53	22	100.00
Aviation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Navigation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	42	35	21	32	45	36	125	148	70	50	53	22	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass	3	3	3	4	4	4	5	5	5	5	6	9	9	10	11	12	12	12	13	13	13	13	14	14	14	15	15	333.39
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
Indirect CO_2[3]	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
Total CO_2 equivalent emissions without land use, land-use change and forestry	652	652	638	623	572	522	562	626	647	627	624	698	649	612	683	674	679	697	688	715	627	714	761	613	595	553	557	-14.57
Total CO_2 equivalent emissions with land use, land-use change and forestry	653	653	638	623	572	523	562	626	648	627	625	698	650	612	684	675	680	698	689	716	627	715	762	614	596	555	558	-14.44
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

Table VII.B.1: *Emission trends (CO_2), Greenland (i.e. not EU territory)*

CTF: Table 1

(cont.) Emission trends (CO2)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

CO_2 — Submission 2017 v1

(Sheet 2 of 6) — GREENLAND

Greenland

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	622	622	607	593	543	493	531	594	614	593	591	664	614	576	646	636	641	659	650	674	589	675	722	575	558	517	520	-16.28
A. Fuel combustion (sectoral approach)	622	622	607	593	543	493	531	594	614	593	591	664	614	576	646	636	641	659	650	674	589	675	722	575	558	517	520	-16.28
1. Energy industries	182	182	177	173	156	140	121	122	129	126	129	132	133	134	134	138	137	142	135	144	126	226	252	111	94	96	110	-39.56
2. Manufacturing industries and construction	26	26	26	25	23	20	44	45	46	40	46	48	46	43	50	51	55	56	57	59	43	39	47	37	39	25	23	-11.45
3. Transport	96	96	96	94	87	81	89	93	97	101	105	106	96	92	101	114	112	121	110	117	106	108	116	111	110	105	104	8.34
4. Other sectors	309	309	301	293	270	246	271	328	336	319	305	371	333	300	354	326	329	330	339	344	298	277	286	301	309	289	273	-11.55
5. Other	8	8	8	8	7	6	7	7	7	7	7	7	7	7	7	7	7	10	8	10	16	24	21	16	5	2	10	18.46
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Industrial processes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.30
A. Mineral industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.29
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use																												
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-50.00
A. Enteric fermentation																												
B. Manure management																												
C. Rice cultivation																												
D. Agricultural soils																												
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues																												
G. Liming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-50.00
H. Urea application	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
I. Other carbon-containing fertilizers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
J. Other																												
4. Land use, land-use change and forestry [2]	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	406.18
A. Forest land	NO,IE	NO,IE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00
C. Grassland	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	407.43
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Other land																												
G. Harvested wood products	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
H. Other																												
5. Waste	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	23.42
A. Solid waste disposal	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00
B. Biological treatment of solid waste																												
C. Incineration and open burning of waste	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	23.42
D. Waste water treatment and discharge																												
E. Other																												
6. Other *(as specified in summary 1.A)*																												
Memo items:																												
International bunkers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	42	35	21	32	45	35	124	147	70	50	52	22	100.00
Aviation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Navigation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	42	35	21	32	45	35	124	147	70	50	52	22	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass	3	3	3	4	4	4	5	5	5	5	6	9	9	10	11	12	12	12	13	13	13	13	14	14	14	15	15	333.39
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O																												
Indirect CO_2 [3]	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
Total CO_2 equivalent emissions without land use, land-use change and forestry	624	624	610	596	546	496	534	597	618	597	595	667	618	580	650	640	644	662	653	678	593	679	725	579	561	521	524	-16.11
Total CO_2 equivalent emissions with land use, land-use change and forestry	625	625	610	596	546	496	535	597	618	597	595	668	619	580	651	641	645	663	654	679	593	680	727	580	562	522	525	-15.97
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

Table VII.B.1: Emission trends (CH_4), Greenland (i.e. not EU territory)

CTF: Table 1

(cont.) Emission trends (CH4)

CRF: TABLE 10 EMISSION TRENDS
CH_4
(Sheet 3 of 6)
Greenland

Inventory 2015
Submission 2017 v1
GREENLAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.05	-2.96
A. Fuel combustion (sectoral approach)	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.05	-2.96
1. Energy industries	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	15.19
2. Manufacturing industries and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-13.87
3. Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	79.58
4. Other sectors	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-17.98
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.79
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
C. CO_2 transport and storage																												
2. Industrial processes	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
A. Mineral industry																												
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use																												
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	0.31	0.31	0.31	0.28	0.25	0.27	0.29	0.30	0.33	0.31	0.28	0.27	0.28	0.27	0.27	0.29	0.30	0.29	0.29	0.29	0.28	0.29	0.28	0.28	0.28	0.26	0.25	-20.15
A. Enteric fermentation	0.31	0.31	0.31	0.28	0.24	0.26	0.28	0.29	0.32	0.31	0.28	0.27	0.27	0.26	0.27	0.28	0.29	0.28	0.29	0.28	0.28	0.28	0.28	0.28	0.27	0.26	0.24	-20.13
B. Manure management	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-20.67
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Liming																												
H. Urea application																												
I. Other carbon-containing fertilizers																												
J. Other																												
4. Land use, land-use change and forestry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
A. Forest land																												
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Wetlands																												
E. Settlements																												
F. Other land																												
G. Harvested wood products																												
H. Other																												
5. Waste	0.28	0.28	0.28	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	-7.98
A. Solid waste disposal	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.18	5.45
B. Biological treatment of solid waste	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Incineration and open burning of waste	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.08	0.09	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-29.58
D. Waste water treatment and discharge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
E. Other																												
6. Other *(as specified in summary 1.A)*																												
Total CH_4 emissions without CH_4 from LULUCF	0.64	0.64	0.65	0.62	0.58	0.61	0.63	0.65	0.68	0.66	0.63	0.61	0.61	0.60	0.60	0.61	0.62	0.62	0.62	0.61	0.60	0.61	0.60	0.59	0.59	0.57	0.56	-13.50
Total CH_4 emissions with CH_4 from LULUCF	0.64	0.64	0.65	0.62	0.58	0.61	0.63	0.65	0.68	0.66	0.63	0.61	0.61	0.60	0.60	0.61	0.62	0.62	0.62	0.61	0.60	0.61	0.60	0.59	0.59	0.57	0.56	-13.50
Memo items:																												
International bunkers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	100.00
Aviation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Navigation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass																												
CO_2 captured																												
Long-term storage of C in waste disposal sites																												
Indirect N_2O																												
Indirect CO_2 (3)																												

Table VII.B.1: Emission trends (N_2O), Greenland (i.e. not EU territory)

CTF: Table 1

(cont.) Emission trends (N2O)

CRF: TABLE 10 EMISSION TRENDS

N_2O

(Sheet 4 of 6)

Greenland

Inventory 2015

Submission 2017 v1

GREENLAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.99
A. Fuel combustion (sectoral approach)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.99
1. Energy industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2.10
2. Manufacturing industries and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-10.89
3. Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.65
4. Other sectors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-11.84
5. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.79
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO,NA	NO,NA	NO	NO	NO	NO	0.00
C. CO_2 transport and storage																												
2. Industrial processes	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
A. Mineral industry																												
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry																												
D. Non-energy products from fuels and solvent use	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	35.53
A. Enteric fermentation																												
B. Manure management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-14.26
C. Rice cultivation																												
D. Agricultural soils	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	86.98
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Liming																												
H. Urea application																												
I. Other carbon containing fertlizers																												
J. Other																												
4. Land use, land-use change and forestry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
A. Forest land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Grassland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Wetlands	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products																												
H. Other																												
5. Waste	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-39.15
A. Solid waste disposal																												
B. Biological treatment of solid waste	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-24.62
D. Waste water treatment and discharge	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	-40.65
E. Other																												
6. Other *(as specified in summary 1.A)*																												
Total direct N_2O emissions without N_2O from LULUCF	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	-20.60
Total direct N_2O emissions with N_2O from LULUCF	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	-20.60
Memo items:																												
International bunkers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Aviation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Navigation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass																												
CO_2 captured																												
Long-term storage of C in waste disposal sites																												
Indirect N_2O	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
Indirect CO_2 [(3)]																												

Table VII.B.1: Emission trends (HFCs, PFCs, SF_6 AND NF_3), Greenland (i.e. not EU territory)

CTF: Table 1

(cont.) Emission trends (HFCs, PFCs, SF6 and NF3)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

HFCs, PFCs, SF_6, and NF_3 — Submission 2017 v1

(Sheet 5 of 6) — GREENLAND

Greenland

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.02	0.03	0.09	0.45	0.83	1.50	2.19	3.47	4.57	5.57	6.35	6.41	6.45	7.00	7.50	7.55	7.77	8.18	8.37	8.99	8.53	10.18	100.00
Emissions of HFCs - (kt CO_2 equivalent)	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.02	0.03	0.09	0.45	0.83	1.50	2.19	3.47	4.57	5.57	6.35	6.41	6.45	7.00	7.50	7.55	7.77	8.18	8.37	8.99	8.53	10.18	100.00
HFC-23	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-32	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-41																												
HFC-43-10mee																												
HFC-125	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-134																												
HFC-134a	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-143																												
HFC-143a	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-152																												
HFC-152a	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-161																												
HFC-227ea	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-236cb																												
HFC-236ea																												
HFC-236fa																												
HFC-245ca																												
HFC-245fa																												
HFC-365mfc																												
Unspecified mix of HFCs(4) - (kt CO_2 equivalent)	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Emissions of PFCs - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CF_4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C_2F_6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C_3F_8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C_4F_{10}																												
$c\text{-}C_4F_8$	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C_5F_{12}																												
C_6F_{14}	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
$C_{10}F_{18}$																												
$c\text{-}C_3F_6$																												
Unspecified mix of PFCs(4) - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Emissions of SF_6 - (kt CO_2 equivalent)	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
SF_6	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	NO,NE,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Emissions of NF_3 - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00

Summary information on Greenland's national inventory arrangements

Greenland's national inventory is compiled by Statistics Greenland and then submitted to DCE (Danish Centre for Environment and Energy). DCE reports to the UNFCCC on behalf of the Danish Realm.

Quantified economy-wide emission reduction target

Greenland has neither reduction commitments nor targets for greenhouse gas emissions in the period 2013-2020.

In August 2012, a cooperation agreement relating to the international climate change negotiations was signed by representatives from the Danish Government and the Government of Greenland. The agreement serves to facilitate closer cooperation on matters of mutual interest and to improve Greenlandic access to information and consultation in relation to the UNFCCC negotiations.

In 2012, the Government of Greenland requested Denmark to effectuate a territorial exclusion for Greenland, when ratifying the second commitment period of the Kyoto Protocol.

A territorial exclusion means that Greenland will be exempted from international reduction commitments in the period 2013-2020. It further implies that Denmark's ratification of the second commitment period of the Kyoto Protocol will not have any consequences for Greenland.

Progress in achievement of quantified economy-wide emission reduction targets and relevant information

Mitigation actions and their effects

<u>Renewable energy and energy efficiency</u>

During the last decades, it has been a consistent priority to expand the use of renewable energy. In 2015, about 18 % of the total energy consumption came from renewable sources. 61 % of the national energy production of heat and electricity was based on renewable energy, of which about 94 % came from hydropower and about from 6 % waste incineration. All sustainable energy from hydropower and waste incineration is used by the national energy company, Nukissiorfiit. Thus, 64.1% of the company's total energy sales come from sustainable energy.

The potential resources for solar energy, wind energy and geothermal heat production are being explored on a smaller scale with possibilities for future expansion.

Policies and measures targeting energy production and energy consumption have multiple purposes. In addition to emission reductions, the shift to renewable energy sources is associated with a decreasing dependence on imported fossil fuels and positive effects on the local and regional environment.

The objectives of the coalition agreement 2016-2018 states that Greenland has to achieve 100% renewable energy production in 2024. In this regard a number of studies and activities have been commissioned to facilitate future developments in the energy sector towards this direction.

Road transport

The number of electric cars in Greenland has increased from approximately zero to about 256 in the last five years. The government actively promotes the use of electric cars by exempting them from taxes and by actively breaking down other barriers.

Heating

New standards for insulation of new buildings are negotiated at the moment. The standards are expected to lead to better insulation of new buildings.

The possibilities for using the heat pump technology, i.e. geothermal heating and sea water heat, are studied in pilot plants.

Shipping

A number of actions have been taken to increase the level of available information on emissions from shipping within the Territorial Waters of Greenland (three nautical miles from the coastline) and to describe possible measures.

Niras (2014)[33] examines the pros and cons of regulating the emissions of greenhouse gases from ships within the Territorial Waters of Greenland. The report presents scenarios for emissions in 2020 based on the adoption of international maritime law.

A study on the opportunities and barriers for introducing shorepower from hydropower for ships at berth at Nuuk harbor Sikuki has been introduced..

Estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use change and forestry activities

Not applicable.

Projections

Total greenhouse gas emissions in Greenland in 1990, 1995, 2000, 2005, 2010 and 2015 are shown in Table VII.B.2.

Table VII.B.2 *Total greenhouse gas emissions (kt CO_2 equivalents) in 1990, 1995, 2000, 2005, 2010 and 2015*

Source: Statistics Greenland (2017).

GHG (kt CO_2 Equivalents)	1990	1995	2000	2005	2010	2015
Total (without LULUCF)	652.48	561.71	697.68	679.00	713.53	557.41
Total (with LULUCF)	652.69	562.10	698.20	679.63	714.95	558.46

Greenland is likely to experience significant industrial growth over the coming years, which will impact on future emission levels. Possible sources of new emissions include:

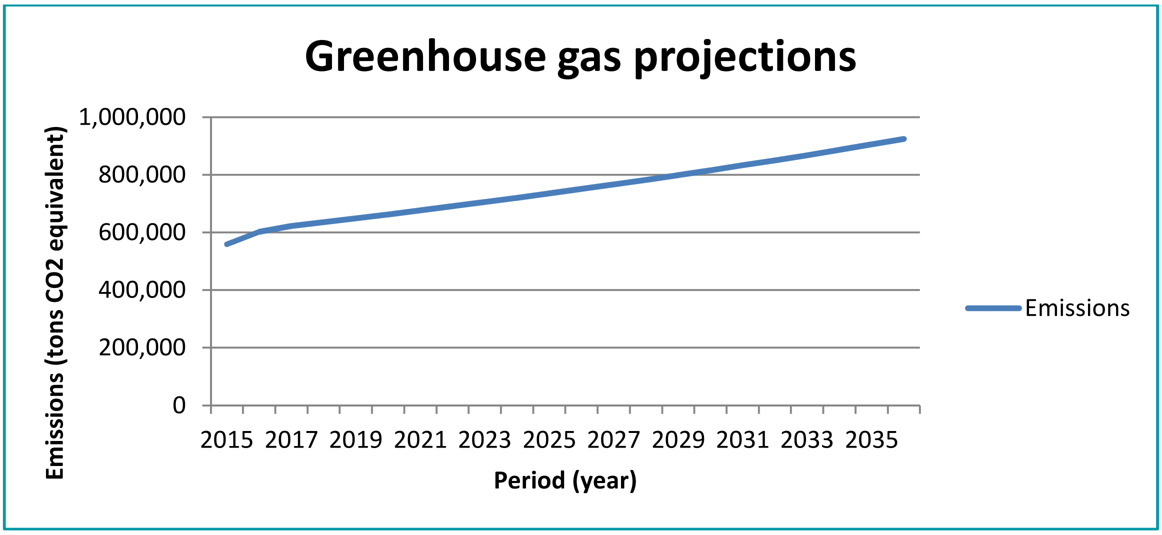
[33] Niras (2014). Emissioner fra skibe. Departementet for Miljø og Natur December 2013.

- Further growth in the mining industry with the establishment of new mines
- Continuation of oil and gas explorations

A number of exploration projects are ongoing, however the projected emissions related to these projects are subject to a significant degree of uncertainty and future scenarios have therefore not been included.

According to the latest data from Greenland Statistics the total greenhouse gas emissions is recorded at 558,456 tons CO_2 in the year 2015[34]. Greenland's economic council has prepared a national economic outlook which projects the 2016 GDP growth rate at 6.9%[35], while the expected growth rate in 2018 being at 2.6%[35]. This rate has been maintained as a constant value throughout the period 2018 to 2036. Moreover upcoming mining activities in Aappaluttoq and Kangerlussuaq have been accounted for in the projections. The projected Greenlandic total annual greenhouse gas emissions 2016-2035 are shown in Figure VII.B.3 together with the inventory total for 2015.

Figure VII.B.3 *Greenland's total greenhouse gas emissions in kt in 2015-36, emissions in 2015 are observed and 2016-2036 projected*



C. Faroe Islands

Information on greenhouse gas emissions and trends

Summary information from Faroe Islands' greeenhouse gas inventory on emissions and emission trends

Table VII.C.1 and figures VII.C.1 and VII.C.2 show the development in the Faroe Islands' greenhouse gas emissions and removals as CO_2 equivalents and by sources and gases according to the reporting guidelines under the Climate Convention (i.e. the Faroe Islands' contribution to the total of the Realm).

[34] http://www.stat.gl/dialog/main.asp?lang=da&version=201702&sc=EN&subthemecode=t2&colcode=t
[35]http://naalakkersuisut.gl/~/media/Nanoq/Files/Attached%20Files/Finans/ENG/GOR%202017%20rapport%20ENG.pdf

As shown in Figure VII.C.1 the development in total greenhouse gas emissions in CO_2 equivalents has increased by 20.4 % from 1990 to 2015. The total Faroese greenhouse gas emissions corresponded to 868kt of CO2 equivalents in 2015.

As also shown in Figure VII.C.1 the main part - i.e. 93 % - of the emissions were from the fuel consumption including waste incineration in the energy sector in 2015. Almost 4 % were from Industrial processes and Product Use and a just above 3 % from Agriculture. The fluctuations in the GHG emissions in the Energy sector are decisive for the fluctuations in the total GHG emissions. The emissions from the Agriculture sector and from Industrial processes and Product Use are relative small and constant.

Figure VII.C.2 shows that CO_2 is the most important greenhouse gas, followed by F-gases, CH_4 and N_2O. Of the total Faroese greenhouse gas emissions in 2015, CO_2 made up 92.2%, F-gases (HFCs and SF_6) 3.9%, methane 2.6% and nitrous oxide 1.3%.

From 1990 to 1993, a decrease in total Faroese greenhouse gas emissions is observed, due to an economic crisis in the Faroe Islands, which lasted for 6-8 years. From 2001 to 2007, the emissions were rather stabile. In 2008-2011 the emissions from Faroese fishing vessels were – except for 2010 – significantly lower than previous years, especially due to rising oil prices and lower prices on fish. The decrease is concealed by emissions related to new bunkering activity starting in 2009 that has led to a substantial increase in the number of foreign fishing vessels bunkering in the Faroe Islands. In 2015, the total emissions were 20 % above 1990, the base year.

***Figure VII.C.1** Greenhouse gas emissions by sector for 2015 and development 1990 to 2015*

Source: Nielsen et al. (2017).

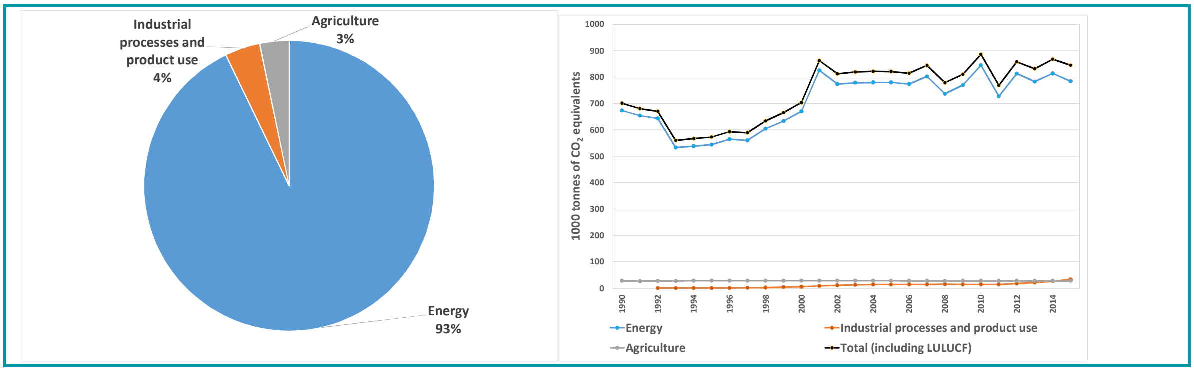
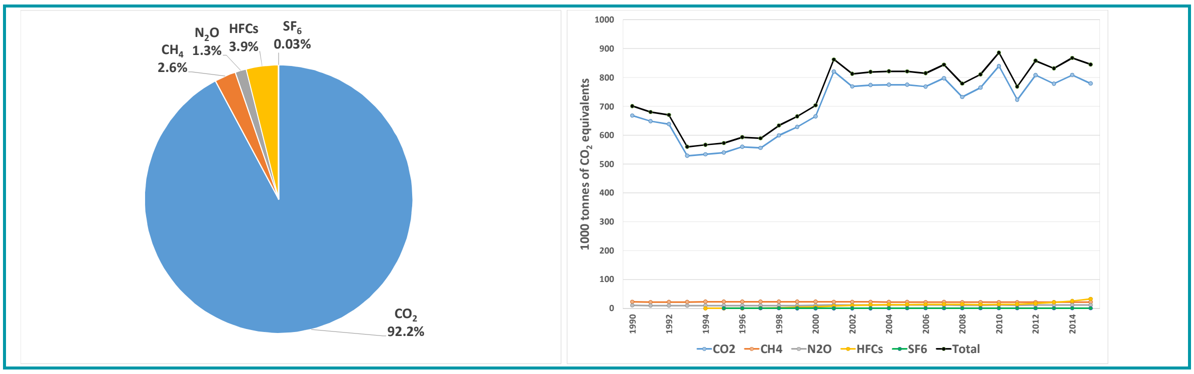


***Figure VII.C.2** Emissions of GHG by gas in 2015 and development 1990-2015.*

Source: Nielsen et al. (2017).



Carbon dioxide, CO_2

The emission of CO_2 in the Faroe Islands is from fuel consumption (incl. waste incineration). The trend in the total emission of CO_2 (Figure VII.C.3) is nearly identical with the trend of the total emission of GHG in the Faroe Islands (Figure VII.C.2) showing the trends in CO_2 emissions in the period from 1990 to 2013. After the economic decline in the 1990s the emissions rose and were rather constant until 2007. From 2008 to 2013 the effort in the Faroese fishing fleet was significantly lower than previous years, also meaning a significant reduction in oil consumption. The reduction in the emissions for fisheries in 2009 and 2011 is not visible because a new oil bunkering activity (mostly used by foreign fishing vessels) started up in 2009, increasing the emissions.

Figure VII.C.3 *Total CO_2 emissions by sector for 2013 and development 1990 to 2013*

Source: Nielsen et al. (2015).

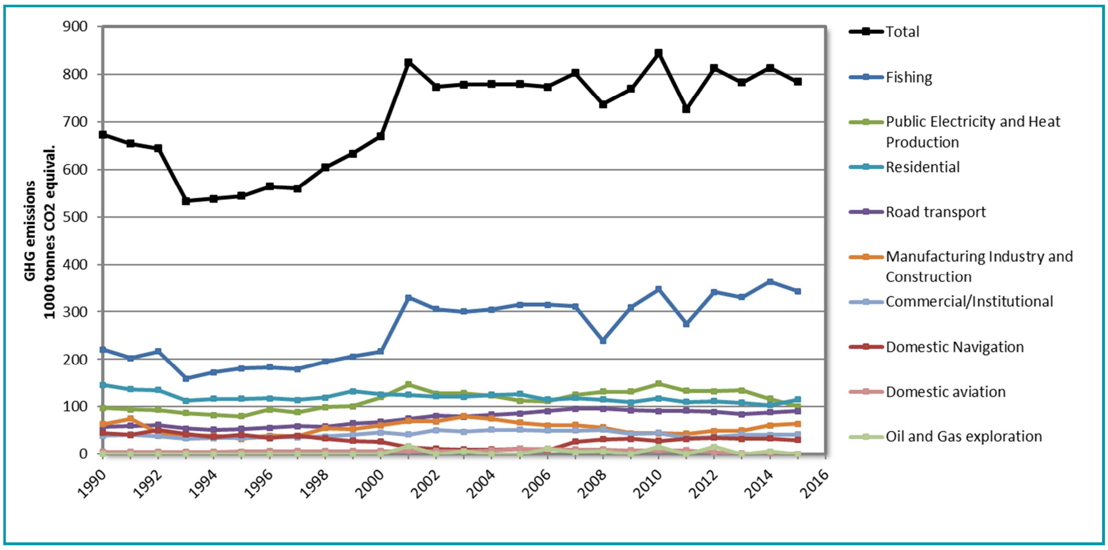
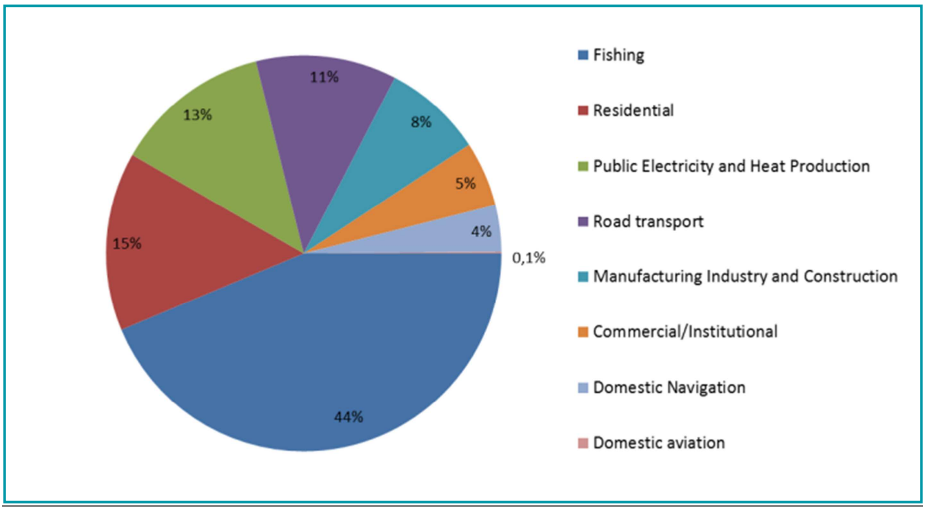


Figure VII.C.4 shows how the emissions are distributed between categories. In 2015 44 % of the CO_2 emission came from fishing vessels. Households accounted for 15 %, public electricity and heat production for 13 % and road transport for 11 % of the total CO_2 emission.

Figure VII.C.4 *Emissions of CO_2 in the energy sector, divided in fuel consumption categories, 2015*

Source: Nielsen et al. (2017).

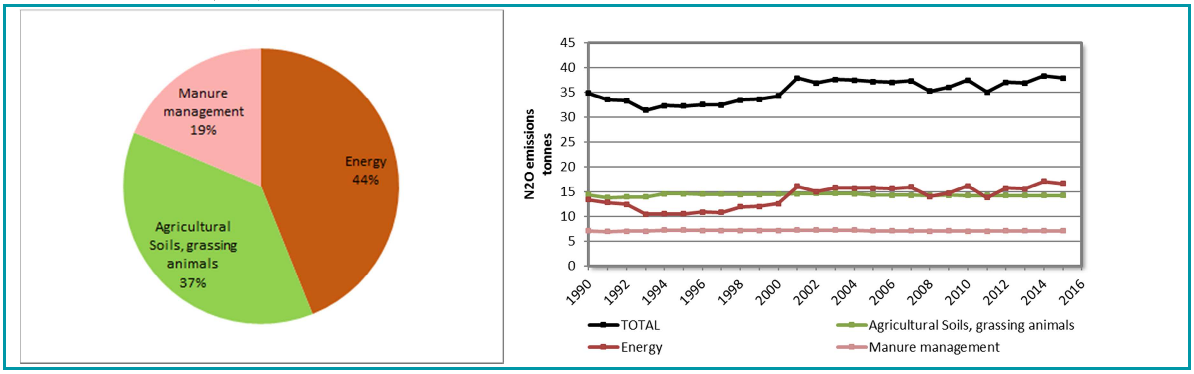


Nitrous oxide, N_2O

Figure VII.C.5 shows the emissions of nitrous oxide in the Faroe Islands 1990-2015. Around 40 % of the N_2O comes from energy and another 40 % comes from agricultural soils. The rest, around 20 %, comes from manure management.

Figure VII.C.5 ***N_2O emissions by sector in 2015 and development 1990-2015***

Source: Nielsen et al. (2017).

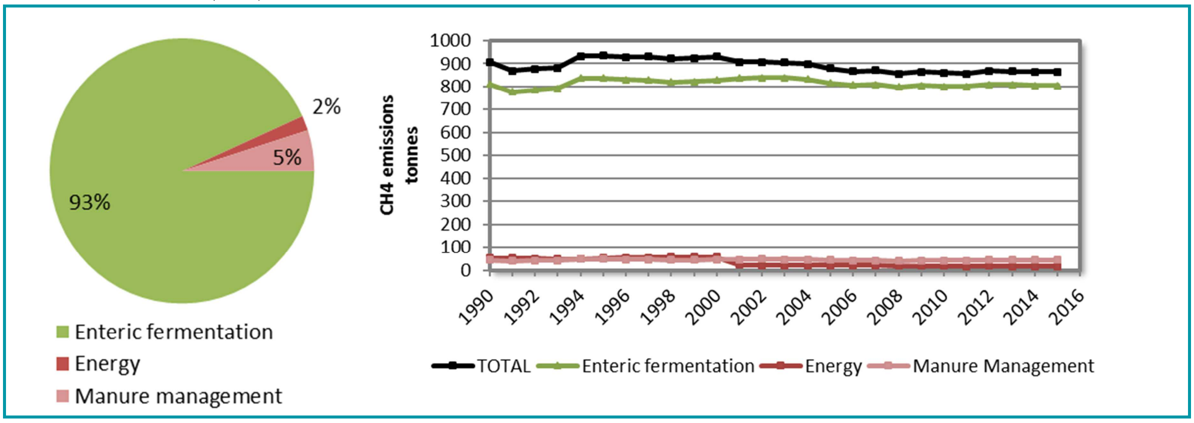


Methane, CH_4

Figure VII.C.6 shows the emissions of methane in the Faroe Islands 1990-2015. Most of the methane emission is from the agriculture sector, especially from enteric fermentation (93 %). Most of the emission of CH_4 in the energy sector is due to aviation activity.

Figure VII.C.6 *CH_4 **e**missions, by sector in 2015 and development 1990-2015*

Source: Nielsen et al. (2017).

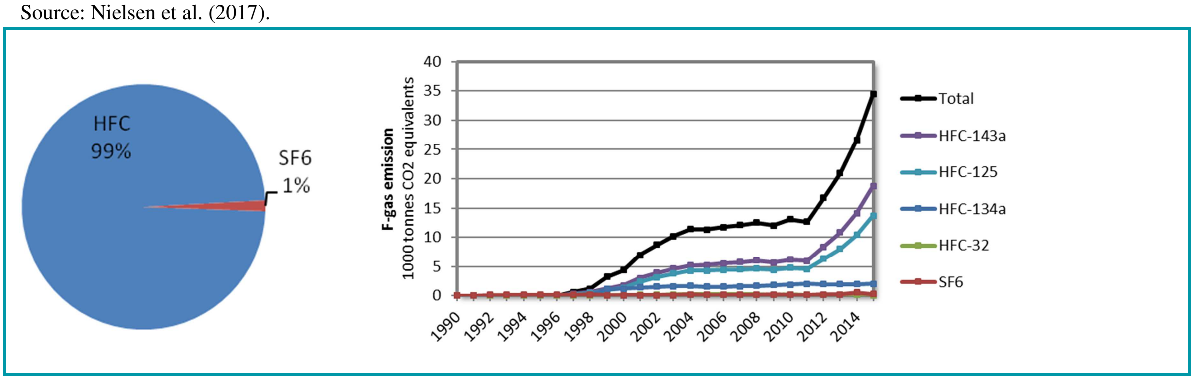


The f-gases: HFCs, PFCs, SF_6 and NF_3

Figure VII.C.7 shows the emissions of F-gases, HFCs and SF_6 respectively in the years 1990-2015. Most of the emission is HFCs, used for refrigeration purposes, as substitutes for HCFCs. After the emissions increased in the period 1996-2005, the emissions were rather stable at around 12,000 tonnes of CO_2 equivalents pr. year until 2011, whereafter there has been a steep increase in the emissions of HFCs. This is due to higher use of HFC-125 and HFC-143a, both components in the HFC-blend HFC-507a, which in recent years has been used as a substitute when phasing out HCFC-22 (ozone depleting freezing agent) on fishing vessels. In 2015 the emissions of HFCs were around 35,000 tonnes of CO_2 equivalents.

Figure VII.C.7 *F-gas **e**missions, by type of gas in 2015 and development 1990-2015*

Source: Nielsen et al. (2017).



Neither PFCs nor NF_3 have been used in the Faroe Islands.

The summary tables from the Faroe Islands' greenhouse gas inventory are shown in Table VII.C.1 below (similar to the format of table 1 of the CTF).

Table VII.C.1: *Emission trends (SUMMARY), Faroe Islands (i.e. not EU territory)*

CTF: Table 1

Emission trends: summary

CRF: TABLE 10 EMISSION TRENDS
SUMMARY
(Sheet 6 of 6)

Inventory 2015
Submission 2017 v1
FAROE ISLANDS

Faroe Islands

GREENHOUSE GAS EMISSIONS	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO_2 equivalent (kt)																											(%)
CO_2 emissions without net CO_2 from LULUCF	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809	779	16.63
CO_2 emissions with net CO_2 from LULUCF	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809	779	16.63
CH_4 emissions without CH_4 from LULUCF	22	22	22	22	22	23	23	23	23	23	23	23	22	22	22	22	22	22	22	21	21	21	21	22	21	21	22	-4.04
CH_4 emissions with CH_4 from LULUCF	22	22	22	22	22	23	23	23	23	23	23	23	22	22	22	22	22	22	22	21	21	21	21	22	21	21	22	-4.04
N_2O emissions without N_2O from LULUCF	10	10	10	10	9	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	10	11	11	11	11	8.97
N_2O emissions with N_2O from LULUCF	10	10	10	10	9	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	10	11	11	11	11	8.97
HFCs	NO	NO	NO	NO	NO	0	0	0	1	1	4	5	8	10	12	13	13	14	14	14	13	14	14	17	21	26	33	100.00
PFCs																												
Unspecified mix of HFCs and PFCs																												
SF_6	NA,NO	NA,NO	NA,NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	100.00
NF_3																												
Total (without LULUCF)	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868	845	20.56
Total (with LULUCF)	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868	845	20.56
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO_2 equivalent (kt)																											(%)
1. Energy	673	673	654	643	533	538	544	564	560	604	633	670	826	774	779	780	780	773	803	737	769	845	727	813	783	814	784	16.51
2. Industrial processes and product use	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	0	1	2	4	5	8	10	12	13	13	14	14	14	14	14	14	17	21	26	33	100.00
3. Agriculture	28	28	26	27	27	28	28	28	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27	27	27	28	-0.14
4. Land use, land-use change and forestry[(5)]																												
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	0.00
6. Other																												
Total (including LULUCF)[(5)]	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868	845	20.56

Table VII.C.1: *Emission trends (GHGs), Faroe Islands (i.e. not EU territory)*

CTF: Table 1

(cont.) Emission trends (GHG)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

GHG CO_2 eq emissions — Submission 2017 v1

(Sheet 1 of 6) — FAROE ISLANDS

Faroe Islands

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt CO_2 eq)																											%
Total (net emissions)(2)	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868	845	20.56
1. Energy	673	673	654	643	533	538	544	564	560	604	633	670	826	774	779	780	780	773	803	737	769	845	727	813	783	814	784	16.51
A. Fuel combustion (sectoral approach)	673	673	654	643	533	538	544	564	560	604	633	670	826	774	779	780	780	773	803	737	769	845	727	813	783	814	784	16.51
1. Energy industries	97	97	94	93	87	82	80	94	88	99	101	120	164	127	134	123	113	123	129	137	132	164	133	148	134	123	100	3.22
2. Manufacturing industries and construction	63	63	75	44	40	39	33	39	38	55	54	60	70	69	80	75	67	61	62	57	44	44	44	49	50	61	64	0.66
3. Transport	107	107	105	116	101	93	100	95	105	98	100	101	95	99	96	100	108	110	132	137	133	127	131	127	119	123	122	13.85
4. Other sectors	406	406	381	390	305	324	332	336	329	352	379	389	497	478	469	481	492	480	480	406	461	509	419	489	480	507	499	22.86
5. Other																												
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Industrial Processes	NO,NE,NA	NO,NE,NA	NO,NE,NA	0	0	0	0	0	1	2	4	5	8	10	12	13	13	14	14	14	14	14	14	17	21	26	33	100.00
A. Mineral industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Electronic industry																												
F. Product uses as ODS substitutes	NO	NO	NO	NO	NO	0	0	0	1	1	4	5	8	10	12	13	13	14	14	14	13	14	14	17	21	26	33	100.00
G. Other product manufacture and use	NA,NO	NA,NO	NA,NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	100.00
H. Other																												
3. Agriculture	28	28	26	27	27	28	28	28	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27	27	27	28	-0.14
A. Enteric fermentation	20	20	19	20	20	21	21	21	21	20	21	21	21	21	21	21	20	20	20	20	20	20	20	20	20	20	20	-0.85
B. Manure management	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5.74
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-0.91
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Liming	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
H. Urea application	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
I. Other carbon-containing fertilizers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
J. Other																												
4. Land use, land-use change and forestry(2)																												
A. Forest land																												
B. Cropland																												
C. Grassland																												
D. Wetlands																												
E. Settlements																												
F. Other land																												
G. Harvested wood products																												
H. Other																												
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	0.00
A. Solid waste disposal	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
B. Biological treatment of solid waste	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
C. Incineration and open burning of waste	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	0.00
D. Waste water treatment and discharge	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Other																												
6. Other ***(as specified in summary 1.A)***																												
Memo items:																												
International bunkers	NE,NO	NE,NO	0	106	144	142	133	144	140	114	124	139	148	99	89	99	86	39	32	29	71	44	51	61	27	38	24	100.00
Aviation	NE,NO	NE,NO	0	0	0	0	0	1	1	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	100.00
Navigation	NE,NO	NE,NO	NE,NO	106	144	141	133	143	139	113	122	137	147	98	88	98	85	37	31	28	70	43	50	60	26	38	24	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass	16	16	16	17	16	16	17	18	21	26	28	28	29	30	27	25	25	25	29	28	25	28	26	26	24	28	28	78.51
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect CO_2 (3)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Total CO_2 equivalent emissions without land use, land-use change and forestry	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868	845	20.56
Total CO_2 equivalent emissions with land use, land-use change and forestry	701	701	680	670	560	567	573	593	589	634	665	703	862	812	819	821	821	815	844	779	810	886	768	858	832	868	845	20.56
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

Table VII.C.1: *Emission trends (CO_2), Faroe Islands (i.e. not EU territory)*

CTF: Table 1

(cont.) Emission trends (CO2)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

CO_2 — Submission 2017 v1

(Sheet 2 of 6) — FAROE ISLANDS

Faroe Islands

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809	779	16.63
A. Fuel combustion (sectoral approach)	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809	779	16.63
1. Energy industries	97	97	94	93	86	82	79	94	88	99	101	119	164	127	134	123	112	122	129	137	132	164	133	148	134	122	100	3.18
2. Manufacturing industries and construction	62	62	74	44	40	39	32	38	38	54	53	60	69	68	79	74	66	60	61	56	43	44	43	49	50	60	63	0.82
3. Transport	105	105	103	114	99	91	98	93	102	96	98	99	94	98	95	99	107	109	130	136	131	126	130	126	117	122	120	14.90
4. Other sectors	404	404	379	388	303	322	330	335	327	350	377	387	494	476	467	478	489	477	477	404	458	506	416	486	477	504	496	22.76
5. Other																												
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Industrial processes	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
A. Mineral industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use																												
H. Other																												
3. Agriculture	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
A. Enteric fermentation																												
B. Manure management																												
C. Rice cultivation																												
D. Agricultural soils																												
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues																												
G. Liming	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
H. Urea application	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
I. Other carbon-containing fertilizers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
J. Other																												
4. Land use, land-use change and forestry [2]																												
A. Forest land																												
B. Cropland																												
C. Grassland																												
D. Wetlands																												
E. Settlements																												
F. Other land																												
G. Harvested wood products																												
H. Other																												
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	0.00
A. Solid waste disposal	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
B. Biological treatment of solid waste																												
C. Incineration and open burning of waste	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	0.00
D. Waste water treatment and discharge																												
E. Other																												
6. Other ***(as specified in summary 1.A)***																												
Memo items:																												
International bunkers	NE,NO	NE,NO	0	105	143	140	132	142	138	112	122	136	147	98	88	98	85	38	32	29	70	43	51	61	27	38	24	100.00
Aviation	NE,NO	NE,NO	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	100.00
Navigation	NE,NO	NE,NO	NE,NO	105	143	140	132	142	138	112	121	136	146	97	87	97	84	37	31	28	70	42	49	60	26	37	24	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass	16	16	16	17	16	16	17	18	21	26	28	28	29	30	27	25	25	25	29	28	25	28	26	26	24	28	28	78.51
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O																												
Indirect CO_2 [3]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Total CO_2 equivalent emissions without land use, land-use change and forestry	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809	779	16.63
Total CO_2 equivalent emissions with land use, land-use change and forestry	668	668	649	638	529	534	540	560	556	599	628	665	820	769	774	775	775	768	797	732	765	840	723	808	778	809	779	16.63
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

Table VII.C.1: *Emission trends (CH_4), Faroe Islands (i.e. not EU territory)*

CTF: Table 1

(cont.) Emission trends (CH4)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

CH_4 — Submission 2017 v1

(Sheet 3 of 6) — FAROE ISLANDS

Faroe Islands

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-70.08
A. Fuel combustion (sectoral approach)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-70.08
1. Energy industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-5.32
2. Manufacturing industries and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-10.23
3. Transport	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	-90.68
4. Other sectors	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	54.97
5. Other																												
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. CO_2 transport and storage																												
2. Industrial processes	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
A. Mineral industry																												
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use																												
H. Other																												
3. Agriculture	0.85	0.85	0.81	0.82	0.82	0.87	0.87	0.87	0.87	0.86	0.86	0.87	0.88	0.88	0.88	0.87	0.85	0.84	0.84	0.83	0.84	0.83	0.83	0.84	0.84	0.84	0.85	0.03
A. Enteric fermentation	0.81	0.81	0.78	0.79	0.79	0.84	0.84	0.83	0.83	0.82	0.82	0.83	0.84	0.84	0.84	0.83	0.82	0.81	0.81	0.80	0.81	0.80	0.80	0.81	0.81	0.81	0.81	-0.85
B. Manure management	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	20.11
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Liming																												
H. Urea application																												
I. Other carbon-containing fertilizers																												
J. Other																												
4. Land use, land-use change and forestry																												
A. Forest land																												
B. Cropland																												
C. Grassland																												
D. Wetlands																												
E. Settlements																												
F. Other land																												
G. Harvested wood products																												
H. Other																												
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	0.00
A. Solid waste disposal	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
B. Biological treatment of solid waste	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
C. Incineration and open burning of waste	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	0.00
D. Waste water treatment and discharge	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Other																												
6. Other ***(as specified in summary 1.A)***																												
Total CH_4 emissions without CH_4 from LULUCF	0.90	0.90	0.86	0.87	0.87	0.92	0.93	0.92	0.92	0.91	0.92	0.92	0.90	0.90	0.90	0.89	0.87	0.86	0.86	0.85	0.86	0.85	0.85	0.86	0.86	0.86	0.86	-4.04
Total CH_4 emissions with CH_4 from LULUCF	0.90	0.90	0.86	0.87	0.87	0.92	0.93	0.92	0.92	0.91	0.92	0.92	0.90	0.90	0.90	0.89	0.87	0.86	0.86	0.85	0.86	0.85	0.85	0.86	0.86	0.86	0.86	-4.04
Memo items:																												
International bunkers	NE,NO	NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Aviation	NE,NO	NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Navigation	NE,NO	NE,NO	NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass																												
CO_2 captured																												
Long-term storage of C in waste disposal sites																												
Indirect N_2O																												
Indirect CO_2 [3]																												

Table VII.C.1: *Emission trends (N_2O), Faroe Islands (i.e. not EU territory)*

CTF: Table 1

(cont.) Emission trends (N2O)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

N_2O — Submission 2017 v1

(Sheet 4 of 6) — FAROE ISLANDS

Faroe Islands

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	24.48
A. Fuel combustion (sectoral approach)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	24.48
1. Energy industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.40
2. Manufacturing industries and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-11.74
3. Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.52
4. Other sectors	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	40.02
5. Other																												
B. Fugitive emissions from fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. CO_2 transport and storage																												
2. Industrial processes	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	0.00
A. Mineral industry																												
B. Chemical industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C. Metal industry																												
D. Non-energy products from fuels and solvent use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
H. Other																												
3. Agriculture	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.72
A. Enteric fermentation																												
B. Manure management	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.34
C. Rice cultivation																												
D. Agricultural soils	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.91
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Liming																												
H. Urea application																												
I. Other carbon containing fertlizers																												
J. Other																												
4. Land use, land-use change and forestry																												
A. Forest land																												
B. Cropland																												
C. Grassland																												
D. Wetlands																												
E. Settlements																												
F. Other land																												
G. Harvested wood products																												
H. Other																												
5. Waste	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	NO,NE,IE	0.00
A. Solid waste disposal																												
B. Biological treatment of solid waste	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
C. Incineration and open burning of waste	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	0.00
D. Waste water treatment and discharge	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Other																												
6. Other *(as specified in summary 1.A)*																												
Total direct N_2O emissions without N_2O from LULUCF	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	8.97
Total direct N_2O emissions with N_2O from LULUCF	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	8.97
Memo items:																												
International bunkers	NE,NO	NE,NO	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Aviation	NE,NO	NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Navigation	NE,NO	NE,NO	NE,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Multilateral operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
CO_2 emissions from biomass																												
CO_2 captured																												
Long-term storage of C in waste disposal sites																												
Indirect N_2O	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect CO_2 [(3)]																												

Table VII.C.1: *Emission trends (HFCs, PFCs, SF_6 AND NF_3), Faroe Islands (i.e. not EU territory)*

CTF: Table 1

(cont.) Emission trends (HFCs, PFCs, SF6 and NF3)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

HFCs, PFCs, SF_6, and NF_3 — Submission 2017 v1

(Sheet 5 of 6) — FAROE ISLANDS

Faroe Islands

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	0.00	0.00	0.03	0.74	1.41	3.76	5.01	8.08	10.15	11.92	13.30	13.03	13.54	14.00	14.31	13.34	13.90	13.97	16.95	20.95	25.56	32.76	100.00
Emissions of HFCs - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	0.00	0.00	0.03	0.74	1.41	3.76	5.01	8.08	10.15	11.92	13.30	13.03	13.54	14.00	14.31	13.34	13.90	13.97	16.95	20.95	25.56	32.76	100.00
HFC-23																												
HFC-32	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-41																												
HFC-43-10mee																												
HFC-125	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-134																												
HFC-134a	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-143																												
HFC-143a	NO	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
HFC-152																												
HFC-152a																												
HFC-161																												
HFC-227ea																												
HFC-236cb																												
HFC-236ea																												
HFC-236fa																												
HFC-245ca																												
HFC-245fa																												
HFC-365mfc																												
Unspecified mix of HFCs[(4)] - (kt CO_2 equivalent)																												
Emissions of PFCs - (kt CO_2 equivalent)																												
CF_4																												
C_2F_6																												
C_3F_8																												
C_4F_{10}																												
$c\text{-}C_4F_8$																												
C_5F_{12}																												
C_6F_{14}																												
$C_{10}F_{18}$																												
$c\text{-}C_3F_6$																												
Unspecified mix of PFCs[(4)] - (kt CO_2 equivalent)																												
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)																												
Emissions of SF_6 - (kt CO_2 equivalent)	NA,NO	NA,NO	NA,NO	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.09	0.08	0.08	0.09	0.08	0.18	0.15	0.13	0.13	0.15	0.20	0.16	0.15	0.18	0.20	0.59	0.25	100.00
SF_6	NA,NO	NA,NO	NA,NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Emissions of NF_3 - (kt CO_2 equivalent)																												
NF_3																												

Summary information on Faroe Islands' national inventory arrangements

The Environment Agency (FEA), an agency under the Ministry of Health and the Interior (www.himr.fo), is responsible for the annual preparation and submission to the UNFCCC of the Faroe Islands' contribution to the Kingdom of Denmark's National Inventory Report and the GHG inventories in the Common Reporting Format in accordance with the UNFCCC Guidelines. The inventory is done with guidance from and in co-operation with DCE. The work is carried out in co-operation with other Faroese ministries, research institutes, organisations and companies.

For more comprehensive information, fx about the inventory preparation, calculation methods, annual reporting, improvements of emissions inventories, please see Nielsen et al. (2017).

Quantified economy-wide emission reduction target

In 2009 the Minister of the Interior formulated a Climate Policy for the Faroe Islands[36].The principal aim of this policy is to decrease the Faroese dependency on oil and fossil fuels and to increase the use of renewable energy sources significantly. In this way, achieve the ambitious and realistic target of reducing emissions of greenhouse gases by at least 20% in 2020, compared with the level of emissions in 2005. This will in turn make Faroese society less vulnerable to the effects of ever-changing oil prices.

The key information regarding the target is shown in Table VII.C.2 below (similar to the formats of tables 2(a-f) of the CTF).

Table VII.C.2: *Description of Faroe Islands' quantified economy-wide emission reduction target*

Table 2(a)		
Description of quantified economy-wide emission reduction target: base year [a]		
Party	Faroe Islands	
Base year /base period	2005	
	% of base year/base period	% of 1990 [b]
Emission reduction target	20	
Period for reaching target	2020	
[a] Reporting by a developed country Party on the information specified in the common tabular format does		
[b] Optional.		

[36] https://d3b1dqw2kzexi.cloudfront.net/media/5522/veðurlagspolitikkur-føroya.pdf

Table 2(b)

Description of quantified economy-wide emission reduction target: gases and sectors covered [a]

Gases covered		Base year for each gas (year):
CO_2	Yes	2005
CH_4	Yes	2005
N_2O	Yes	2005
HFCs	No	NA
PFCs	No	NA
SF_6	No	NA
NF_3	No	NA
Other gases	No	NA
Sectors covered [b]		
Energy	Yes	
Transport [c]	Yes	
Industrial processes [d]	No	
Agriculture	No	
LULUCF	No	
Waste	No	
Other (specify)	No	

Abbreviations: LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] More than one selection will be allowed. If Parties use sectors other than those indicated above, the explanation of how these sectors relate to the sectors defined by the IPCC should be provided.

[c] Transport is reported as a subsector of the energy sector.

[d] Industrial processes refer to the industrial processes and solvent and other product use sectors.

Table 2(c)

Description of quantified economy-wide emission reduction target: global warming potential values (GWP) [a]

Gases	GWP values [b]
CO_2	AR4
CH_4	AR4
N_2O	AR4
HFCs	AR4
PFCs	AR4
SF_6	AR4
NF_3	AR4
Other gases [c]	NA

Abbreviations: GWP = global warming potential

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Please specify the reference for the GWP: Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) or the Fourth Assessment Report of the IPCC.

[c] Specify.

Table 2(d)

Description of quantified economy-wide emission reduction target: approach to counting emissions and removals from the LULUCF sector [a]

Role of LULUCF	LULUCF in base year level and target	Included	
		Excluded	Excluded
	Contribution of LULUCF is calculated using	Land-based approach	NA
		Activity-based approach	NA
		Other (specify)	NA

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

Table 2(e)I	
Description of quantified economy-wide emission reduction target: market-based mechanisms under the Convention [a]	
	Possible scale of contributions (estimated kt CO2 eq)
CERs	0
ERUs	0
AAUs [b]	0
Carry-over units [c]	0
Other mechanism units under the Convention (specify) [d]	0

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] AAUs issued to or purchased by a Party.

[c] Units carried over from the first to the second commitment periods of the Kyoto Protocol, as described in decision 13/CMP.1 and consistent with decision XX /CMP.8.

[d] As indicated in paragraph 5(e) of the guidelines contained in annex I of decision 2/CP.17.

Table 2(e)II	
Description of quantified economy-wide emission reduction target: other market-based mechanisms [a]	
(Specify)	Possible scale of contributions (estimated kt CO2 eq)
NA	NA

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

Table 2(f)
Description of quantified economy-wide emission reduction target: any other information [a,b]
IE

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] This information could include information on the domestic legal status of the target or the total assigned amount of emission units for the period for reaching a target. Some of this information is presented in the narrative part of the biennial report.

The Climate Policy of the Faroes contains a plan of action on how to reduce emissions of greenhouse gases by at least 20% in 2020, compared with the level of emissions in 2005. The plan is not an exhaustive outline of how this target can be met, but it is a coherent plan of action by the current Government, which can be expanded over time, especially as new and more developed technology is established which can contribute in additional ways to reducing greenhouse gas emissions.

Thus, the action plan for reducing greenhouse gas emissions is based on the quantified economy-wide emission reduction target and the implementation of specific measures in the following three areas:

I. Heating
II. Electricity production
III. Land-based transport

I. Heating.

Target: In 2020 the oil consumption for heating shall be reduced by 50% by putting into place energy saving measures and new energy efficient and environmental friendly technologies.

Measures: The use of environmentally friendly technologies such as heat pumps, newer and more efficient oil burners and boilers, district heating, solar power and other environmental friendly and renewable energy sources. To perform regular inspection of the above-mentioned systems to ensure that these are as energy efficient as possible.

II. Electricity production

Target: In 2020 about 75% of the overall production of electricity derives from renewable energy sources.

Measures: In order to significantly increase the production of electricity from renewable energy sources it is necessary to improve the system.

The Faroese electricity producing company SEV uses about 35,000 tonnes of oil annually for electricity production. In the time-period from 2008-2013, 38-40 % of SEV's overall electricity production was produced from renewable energy sources, including around 35% from hydro energy and around 5% from wind energy. The year 2010 was an exception, with relative less use of renewable energy sources. With more windmills and expansion in waterpower in recent years, 50% of the electricity production was based on renewable energy sources. In 2015 it was even higher, 60%. This year the usage of oil was 27.000, i.e. significantly lower than previous years. Altogether, SEV produces around 300 million kWh of electricity yearly.

III. Land-based transport

Target: In 2020 all gas and diesel fuelled vehicles shall be energy efficient and a significant number of vehicles are to run on renewable energy. The aim is to reduce CO_2 emissions from domestic transport by 50%.

Measures:

- Importing more energy efficient gas and diesel vehicles,
- Encourage the use of vehicles that run on renewable energy,
- Bio-fuels become available when bio fuelled cars are introduced to the Faroese market,
- Public traffic is improved and strategically located junctions provide for easy access.

In addition to above mentioned quantified targets, the government also made target for other three areas:

IV. Ships and aviation

V. Renewable energy

VI. Public awareness and information

In all three cases, the targets have not been quantified, i.e. no specific reduction targets were set.

Progress in achievement of quantified economy-wide emission reduction targets and relevant information

In 2008 the Faroese government published the report Skjótt syftir seiðir og tunga takið (Easy pickings and the long haul)[37], listing an arrow of possible measures to reduce greenhouse gas emissions. Together with the climate policy, these documents are the fundament in reaching the reduction targets for greenhouse gas emissions.

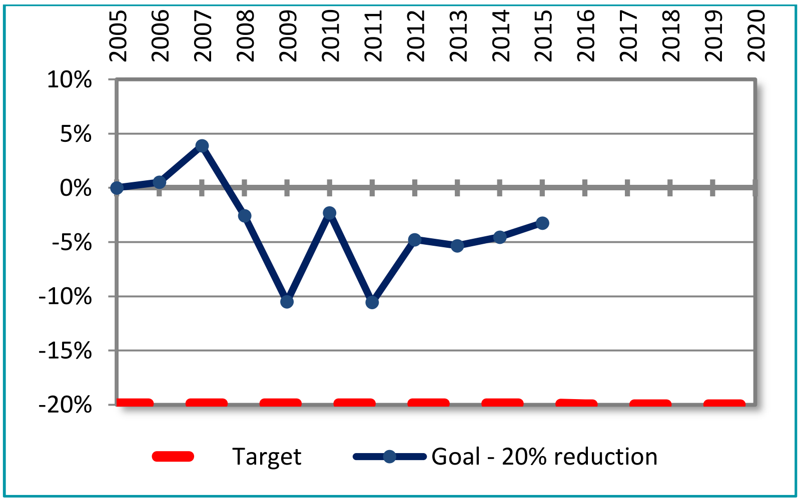
Mitigation actions and their effects

Total emissions

In 2015 the total emission of greenhouse gases had decreased by 3 % compared with the emission in 2005. This means that the emission shall be reduced with another 17 % before 2020 to fulfil the target. See Figure VII.C.8.

Figure VII.C.8 *Total emissions of greenhouse gases in the Faroe Islands 2005-2015, relative compared with 2005 and in tonnes of CO_2 equivalents*

Source: www.us.fo



The total emission of greenhouse gases in Figure VII.C.8 does not include emissions from foreign fishing vessels, and the totals are therefore not the same as the totals reported to IPCC (CRF).

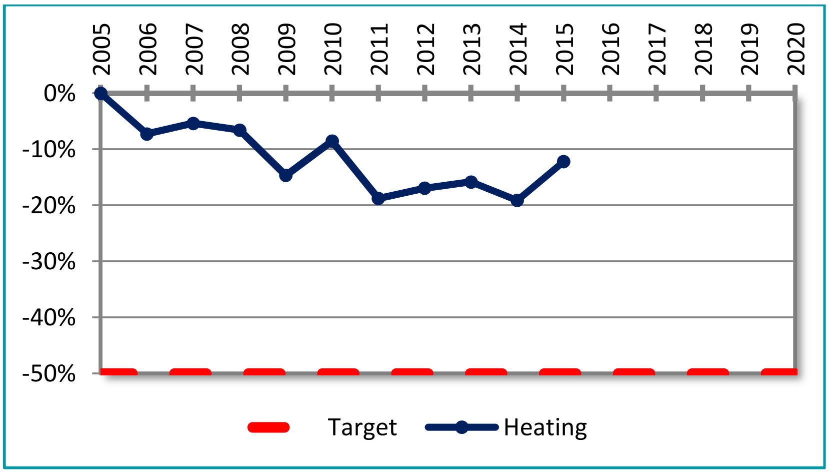
Heating

In accordance with the climate policy the amount of oil used for heating shall be reduced to 50 % in 2020. Apart from 2010, a year with cold weather, there has in general been a fall in the emission from heating since 2005. In 2014 the emissions were about 20 % lower compared with 2005. In 2015 the emissions increased. To fulfil the goal still a 30-38 % reduction remains. See Figure VII.C.9.

[37] http://www.us.fo/Default.aspx?ID=14087

Figure VII.C.9 *Emissions of greenhouse gases from heating 2005-2015, relative compared with 2005 and in tonnes of CO_2 equivalents*

Source: www.us.fo

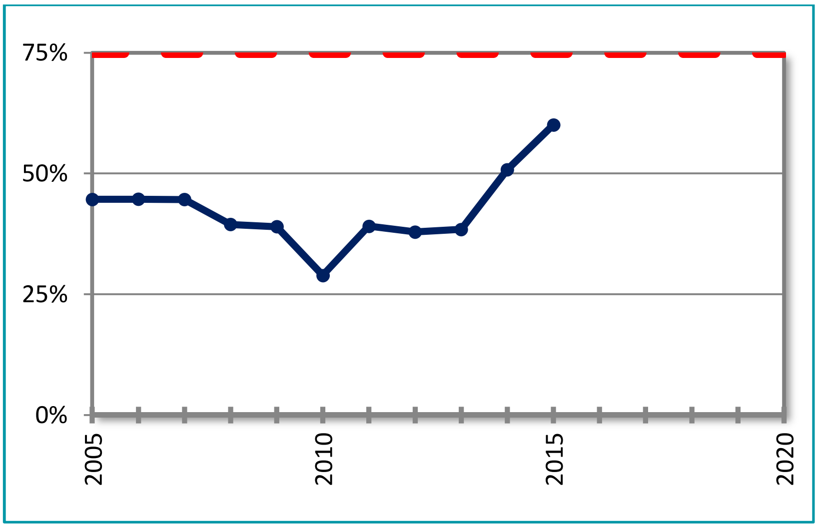


Electricity production

The target for electricity production is that 75 % of the electricity production shall derive from renewable energy in 2020. In 2014 13 new wind turbines were installed and the amount of renewable energy in electricity production in 2014 was more than 50 %. The main electricity company in the Faroe Islands, SEV, has made effective development in the wind power system changing from oil based electricity production to more wind and hydropower. The company has set the goal to be 100 % green in 2030. Thus, with current plans for new wind mills, the 75 % target in the climate policy can be reached. See Figure VII.C10.

Figure VII.C10 *The emissions of greenhouse gases from electricity production 2005-2015, relative compared with 2005 and in tonnes of CO_2 equivalents*

Source: www.us.fo

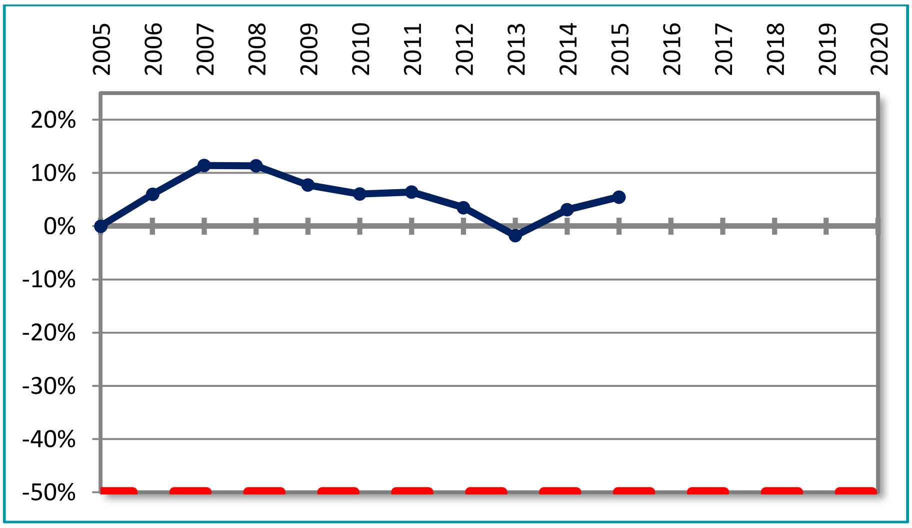


Road traffic

The emission of greenhouse gases from road traffic decreased every year from 2007 to 2013, but has since then increased again (Figure VII.C.11). With the trend until now it is not likely that the 50 % target for road traffic will be reached.

Figure VII.C.11 *Emissions of greenhouse gases from road traffic 2005-2015, relative compared with 2005 and in tonnes of CO_2 equivalents*

Source: www.us.fo



As part of the reporting on progress in achievement of the quantified economy-wide emission reduction target, information on mitigation actions and their effects is shown in Table VII.C.3 below (similar to table 3 of the CTF). In this regard, information on greenhouse gas emissions 2010-2015 is shown in Table VII.C4 (similar to table 4 of the CTF).

***Table VII.C.3:** Progress in achievement of Faroe Islands' quantified economy-wide emission reduction target: information on mitigation actions and their effects*

FO	Table 3 Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects											
	Name of mitigation action [a]	Sector(s) affected [b]	GHG(s)	Objective and/ or activity affected	Type of	Status of implementation [d]	Brief description [e]	Start	Implementing entity	Estimate of mitigation impact (not cumulative, in kt CO2 eq)		
no.										20XX [f] = 2001 2020	20XX [f] = 2015 or annual average	2030
1-1	Better insulation of houses and buildings,	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Regulatory	Partly implemented. Partly planned			Ministry of Health and Interior	NE	NE	NE
1-2	Improve the possibilities of funding for energy saving	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Economic - regulatory	Implemented			Ministry of Finance	NE	NE	NE
1-3	District Heating - Waste Heat from garbage and power production	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Regulatory	Implemented	200 houses in 1995 and 1100 houses in 2015		Municipality	2.4	9	
1-3	Requiremqnts for oil burners, boilers, inspection, heat pumps, district heating and energy systems etc.	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Regulatory	Partly implemented. Partly planned			Ministry of Health and Interior	NE	NE	NE
1-4	Certification requirements for installation, inspection and maintenance of heating and energy systems	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Regulatory	Partly implemented. Partly planned			Ministry of Health and Interior	NE	NE	NE
1-5	Prohibit the import and sale of non-efficient electricity and energy equipment, in conformity with laws in neigh-bouring countries.	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Regulatory	Planned			Ministry of Health and Interior	NE	NE	NE
1-6	Heat Pump. Ground source heat pump campaign and from 2017 VAT excemption	Energy - Heating	CO2, CH4, N2O	Reduce fossile fuel consumption in buildings	Regulatory	Implemented			Ministry of Health and Interior and Ministry of Finance		3	
2-1	Registry fees of motor vehicles shall encourage drivers to buy vehicles with low or no CO2 emissions.	Energy - Transport	CO2, CH4, N2O	Reduce fossile fuel consumption in transport. The law on registry fees of motor vehicles shall encourage drivers to buy and register vehicles with low or no CO2 emissions.	Regulatory	Implemented			Ministry of Finance	NE	NE	NE
3-1	Encourages competition on the green electricity market.	Energy - Public Electricity Production	CO2, CH4, N2O	Reduce prices on green electricity	Regulatory	Implemented			Ministry of Health and Interior	NE	NE	NE
3-2	Further develop the use of renewable energy sources in the electricity production including windpower	Energy - Public Electricity Production	CO2, CH4, N2O	Reduce fossile fuel consumption		Implemented	Wind Parks build: 2003 2,0 MW, 2005 4,7 MW and 2014 11,7 MW		SEV and Røkt. Ministry of Health and Interior	NE	25.2	NE
3-3	Two new Wind Parks	Energy - Public Electricity Production	CO2, CH4, N2O	Reduce fossile fuel consumption		Implemented	5 MW Wind Porkeri and 15 MW Wind Eiði		Ministry of Health and Interior		45	

Note: The two final columns specify the year identified by the Party for estimating impacts (based on the status of the measure and whether an ex post or ex ante estimation is available).
Abbreviations: GHG = greenhouse gas; LULUCF = land use, land-use change and forestry.
[a] Parties should use an asterisk (*) to indicate that a mitigation action is included in the 'with measures' projection.
[b] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors, cross-cutting, as appropriate.
[c] To the extent possible, the following types of instrument should be used: economic, fiscal, voluntary agreement, regulatory, information, education, research, other.
[d] To the extent possible, the following descriptive terms should be used to report on the status of implementation: implemented, adopted, planned.
[e] Additional information may be provided on the cost of the mitigation actions and the relevant timescale.
Table 3

Table VII.C.4: Reporting on Faroe Islands' progress

Table 4				
Reporting on progress [a, b]				
Year [c]	Total emissions excluding LULUCF (kt CO2 eq)	Contribution from LULUCF [d] (kt CO2 eq)	Quantity of units from market based mechanisms under the Convention (number of units and kt CO2 eq)	Quantity of units from other market based mechanisms (number of units and kt CO2 eq)
	(a) total GHG emissions, excluding emissions and removals from the LULUCF sector;	*(b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for;*	*(c) total GHG emissions, including emissions and removals from the LULUCF sector.*	
Base year/base period (specify) 2005	821	NA	NA	NA
2010	886	NA	NA	NA
2011	768	NA	NA	NA
2012	858	NA	NA	NA
2013	832	NA	NA	NA
2014	868	NA	NA	NA
2015	845	NA	NA	NA

Abbreviation: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For the base year, information reported on the emission reduction target shall include the following: (a) total GHG emissions, excluding emissions and removals from the LULUCF sector; (b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for; (c) total GHG emissions, including emissions and removals from the LULUCF sector. For each reported year, information reported on progress made towards the emission reduction targets shall include, in addition to the information noted in paragraphs 9(a–c) of the UNFCCC biennial reporting guidelines for developed country Parties, information on the use of units from market-based mechanisms.

[c] Parties may add additional rows for years other than those specified below.

[d] Information in this column should be consistent with the information reported in table 4(a)I or 4(a)II, as appropriate. The Parties for which all relevant information on the LULUCF contribution is reported in table 1 of this common tabular format can refer to table 1.

Estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use change and forestry activities

Since the Faroe Islands are not a part of the Kyoto Protocol, marked-based mechanisms are not in use.

No estimation has been made regarding emissions reductions/removals in land use, land-use change and forestry activities in the Faroe Islands. Though a continuously work is going on in planting trees, it is in quite small-scale dimensions.

Projections

No projections have been made for the Faroe Islands.

VIII. Common tabular format for UNFCCC biennial reporting

The information to be reported electronicly in the so-called Common Tabular Format (CTF) contained in Decision 19/CP.18 - Document: FCCC/CP/2012/8/Add.3) adopted by the Conference of the Parties on its eighteenth session is included in this chapter. Where the information in the tables shown in this chapter is difficult to read, please see the electronic version of the CTF available on the UNFCCC web-site (http://unfccc.int/national_reports/biennial_reports_and_iar/submitted_biennial_reports/items/7550.php)

As Greenland and the Faroe Islands are not in the EU territory and the assessment of Denmark's contribution to the progress towards the joint EU target for 2020 is relevant to Denmark only. Therefore only inventory data for Denmark are included in Table 1 of the CTF.

Inventory data for Greenland and the Faore Islands are shown separately in Chapter VII. Inventory data for total emissions in the realm are included in Annex A1 of Denmark's Seventh National Communication.

The following notation keys have been used in the tables:

NA = Not Applicable.
NE = Not Estimated.
NO = Not Occuring.
IE = Included Elsewhere.
INA = Information Not Available

TABLE 1: EMISSION TRENDS (SUMMARY) IN DENMARK (I.E. EU TERRITORY, WITHOUT GREENLAND AND THE FAROE ISLANDS)

CTF: Table 1

Emission trends: summary

CRF: TABLE 10 EMISSION TRENDS Inventory 2015

SUMMARY Submission 2017 v2

(Sheet 6 of 6) DENMARK

Denmark under the EU (i.e. without Greenland and the Faroe Islands)

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO_2 equivalent (kt)																											(%)
CO_2 emissions without net CO_2 from LULUCF	53591	53591	64210	58402	60641	64701	61615	74863	65455	61217	58637	54296	55870	55542	60625	55100	51522	59428	54644	51204	48815	49170	44170	39648	41632	37449	35147	-34.42
CO_2 emissions with net CO_2 from LULUCF	58447	58447	68424	63348	64841	68605	65751	78203	69283	65225	62704	58442	60771	61542	66237	60368	56691	64983	57471	49194	50969	48295	41668	39311	42622	37506	39205	-32.92
CH_4 emissions without CH_4 from LULUCF	7624	7624	7814	7892	8087	7977	8051	8165	8055	8111	8016	7907	8146	8074	8080	7905	7671	7576	7560	7429	7285	7347	7185	7057	6951	6947	6849	-10.18
CH_4 emissions with CH_4 from LULUCF	7643	7643	7834	7914	8111	8002	8078	8194	8085	8143	8050	7943	8183	8112	8120	7947	7715	7621	7607	7478	7336	7399	7239	7115	7010	7004	6909	-9.61
N_2O emissions without N_2O from LULUCF	7882	7882	7709	7448	7252	7177	7134	6780	6814	6890	6970	6926	6710	6707	6580	6124	5472	5368	5545	5493	5236	5139	5151	5032	5036	5141	5182	-34.26
N_2O emissions with N_2O from LULUCF	7909	7909	7736	7475	7279	7204	7161	6807	6841	6917	6997	6953	6736	6734	6607	6151	5499	5395	5571	5519	5262	5166	5179	5060	5065	5170	5216	-34.05
HFCs	NO,NA	NO,NA	NO,NA	4	102	146	241	380	376	475	582	704	736	780	812	875	933	958	989	993	951	950	886	801	781	702	634	100.00
PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0	1	2	5	11	16	23	28	28	25	21	19	21	21	18	20	19	16	12	11	9	5	100.00
Unspecified mix of HFCs and PFCs	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
SF_6	42	42	61	85	97	116	102	58	70	57	62	56	28	23	30	31	20	33	28	29	34	36	69	112	131	132	103	143.07
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Total (without LULUCF)	69139	69139	79793	73831	76179	80118	77145	90248	80776	76762	74283	69912	71517	71154	76151	70055	65636	73383	68787	65167	62341	62661	57478	52663	54542	50380	47919	-30.69
Total (with LULUCF)	74042	74042	84055	78826	80430	84074	81334	93644	84661	80828	78411	74120	76482	77219	81829	75393	70876	79012	71688	63233	64572	61864	55057	52411	55619	50524	52072	-29.67
Total (without LULUCF, with indirect)	70356	70356	81052	75059	77385	81280	78282	91372	81824	77766	75220	70786	72366	71965	76947	70819	66371	74081	69444	65795	62911	63217	57982	53138	54993	50801	48331	-31.31
Total (with LULUCF, with indirect)	75259	75259	85314	80054	81635	85236	82472	94768	85709	81832	79348	74994	77331	78031	82625	76158	71611	79709	72345	63861	65143	62420	55561	52886	56070	50945	52484	-30.26

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	CO_2 equivalent (kt)																											(%)
1. Energy	52402	52402	63097	57276	59607	63659	60589	74004	64516	60430	58010	53540	55229	54806	60034	54474	50784	58678	53838	50597	48582	49111	43787	39116	41008	36734	34476	-34.21
2. Industrial processes and product use	2343	2343	2470	2522	2592	2706	2878	3022	3105	3204	3442	3631	3515	3468	3482	3312	2789	2848	2877	2575	2092	2034	2175	2121	2132	2071	1992	-15.01
3. Agriculture	12631	12631	12457	12281	12232	12075	12079	11660	11669	11682	11314	11228	11225	11303	11046	10983	10788	10525	10750	10694	10407	10326	10328	10274	10278	10400	10299	-18.46
4. Land use, land-use change and forestry[5]	4902	4902	4262	4995	4250	3956	4190	3396	3885	4067	4128	4208	4965	6065	5678	5338	5240	5628	2901	-1934	2232	-797	-2421	-252	1077	144	4153	-15.28
5. Waste	1763	1763	1770	1750	1749	1679	1598	1562	1485	1445	1516	1513	1548	1577	1589	1286	1276	1332	1322	1302	1260	1190	1187	1152	1123	1175	1153	-34.64
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Total (including LULUCF)[5]	74042	74042	84055	78826	80430	84074	81334	93644	84661	80828	78411	74120	76482	77219	81829	75393	70876	79012	71688	63233	64572	61864	55057	52411	55619	50524	52072	-29.67

TABLE 1(0): EMISSION TRENDS (GHGS) IN DENMARK (I.E. EU TERRITORY, WITHOUT GREENLAND AND THE FAROE ISLANDS)

CTF: Table 1

(cont.) Emission trends (GHG)

CRF: TABLE 10 EMISSION TRENDS

GHG CO_2 eq emissions

(Sheet 1 of 6)

Inventory 2015
Submission 2017 v2
DENMARK

Denmark under the EU (i.e. without Greenland and the Faroe Islands)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt CO_2 eq)																											%
Total (net emissions)(2)	74042	74042	84055	78826	80430	84074	81334	93644	84661	80828	78411	74120	76482	77219	81829	75393	70876	79012	71688	63233	64572	61864	55057	52411	55619	50524	52072	-29.67
1. Energy	52402	52402	63097	57276	59607	63659	60589	74004	64516	60430	58010	53540	55229	54806	60034	54474	50784	58678	53838	50597	48582	49111	43787	39116	41008	36734	34476	-34.21
A. Fuel combustion (sectoral approach)	51886	51886	62174	56319	58762	62815	59890	73244	63482	59615	56445	52451	54075	53781	59017	53340	49908	57829	52989	49950	48118	48543	43366	38749	40616	36336	34085	-34.31
1. Energy industries	26251	26251	35154	30227	31850	35936	32559	44985	35817	32188	29096	26047	27363	27574	32311	26404	23152	31063	26370	24266	24188	24080	20055	16778	19018	15487	12835	-51.11
2. Manufacturing industries and construction	5460	5460	5997	5852	5705	5794	5921	6072	6113	6135	6222	6019	6125	5827	5790	5854	5543	5669	5381	4882	4056	4422	4339	4027	3919	3956	3887	-28.81
3. Transport	10734	10734	11156	11361	11470	11953	12093	12349	12522	12473	12490	12285	12273	12365	12816	13134	13242	13605	14217	13911	13184	13125	12781	12148	11950	12130	12336	14.93
4. Other sectors	9270	9270	9523	8680	9437	8812	8995	9587	8781	8532	8369	7899	8124	7827	7905	7601	7592	7261	6741	6679	6427	6708	5896	5579	5486	4529	4827	-47.93
5. Other	170	170	343	199	300	319	323	250	249	287	269	201	191	188	195	348	379	232	280	211	263	209	296	217	242	233	199	16.69
B. Fugitive emissions from fuels	516	516	923	957	845	844	699	761	1034	816	1565	1089	1154	1026	1017	1133	876	849	849	647	464	567	420	367	393	398	391	-24.25
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	516	516	923	957	845	844	699	761	1034	816	1565	1089	1154	1026	1017	1133	876	849	849	647	464	567	420	367	393	398	391	-24.25
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Industrial Processes	2343	2343	2470	2522	2592	2706	2878	3022	3105	3204	3442	3631	3515	3468	3482	3312	2789	2848	2877	2575	2092	2034	2175	2121	2132	2071	1992	-15.01
A. Mineral industry	1082	1082	1258	1381	1398	1419	1418	1525	1599	1632	1609	1629	1626	1667	1539	1657	1563	1615	1614	1332	886	804	993	994	996	1021	1052	-2.75
B. Chemical industry	1003	1003	919	812	765	776	870	803	816	776	914	966	852	745	861	511	1	1	1	1	1	1	1	1	1	1	2	-99.84
C. Metal industry	60	60	60	60	70	77	73	44	49	58	59	61	47	0	0	0	16	0	0	0	0	0	0	0	0	0	0	-99.71
D. Non-energy products from fuels and solvent use	165	165	181	190	173	193	185	196	181	187	191	190	175	200	189	191	215	195	197	180	174	203	187	181	192	185	173	4.47
E. Electronic industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	5	9	6	11	13	11	5	4	5	NO	0.00
F. Product uses as ODS substitutes	NO	NO	NO	4	102	146	242	382	382	487	598	726	764	808	837	896	951	974	1001	1005	960	956	891	808	788	706	639	100.00
G. Other product manufacture and use	33	33	52	77	83	94	91	71	78	63	71	59	51	47	55	57	42	57	53	50	59	57	92	131	152	153	126	284.25
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	12631	12631	12457	12281	12232	12075	12079	11660	11669	11682	11314	11228	11225	11303	11046	10983	10788	10525	10750	10694	10407	10326	10328	10274	10278	10400	10299	-18.46
A. Enteric fermentation	4039	4039	4070	4019	4074	3978	3967	3965	3829	3833	3685	3631	3703	3646	3604	3496	3483	3484	3565	3596	3596	3631	3592	3674	3697	3711	3667	-9.22
B. Manure management	2522	2522	2613	2769	2865	2806	2796	2827	2915	3050	2993	3034	3163	3263	3281	3367	3165	2987	2976	2831	2750	2793	2763	2672	2608	2622	2586	2.54
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	5448	5448	5259	5088	4939	4875	4775	4446	4439	4532	4359	4290	4147	4154	3928	3956	3913	3853	4011	4031	3869	3743	3805	3733	3723	3822	3864	-29.07
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Field burning of agricultural residues	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	5	5	5	4	4	4	3	3	4	4	4	4	37.71
G. Liming	565	565	463	357	307	367	496	393	470	252	265	261	201	233	226	158	220	194	192	229	181	153	162	188	244	238	166	-70.72
H. Urea application	15	15	12	13	13	18	15	9	4	4	3	2	2	1	1	1	0	1	1	0	2	1	1	1	1	1	1	-90.50
I. Other carbon-containing fertilizers	38	38	37	33	30	27	26	16	10	7	6	5	4	3	2	1	2	1	1	2	4	3	3	2	2	2	10	-72.68
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry(2)	4902	4902	4262	4995	4250	3956	4190	3396	3885	4067	4128	4208	4965	6065	5678	5338	5240	5628	2901	-1934	2232	-797	-2421	-252	1077	144	4153	-15.28
A. Forest land	-553	-553	-555	-555	-556	-556	-557	-558	-559	-560	-562	-563	639	601	563	527	560	520	-2589	-6513	-1508	-3739	-5779	-4051	-2424	-3970	229	-141.37
B. Cropland	4412	4412	3659	4577	4059	3670	3912	3090	3443	3541	3511	3825	3254	4364	4089	3761	3540	3972	4421	3629	2759	2008	2421	2549	2275	3005	2606	-40.93
C. Grassland	931	931	926	915	914	897	856	889	894	864	834	819	808	803	798	796	878	901	877	888	866	855	873	1141	1170	1142	1363	46.39
D. Wetlands	102	102	94	94	82	79	75	90	112	93	76	76	84	95	91	98	117	121	102	83	98	91	98	80	53	61	55	-45.60
E. Settlements	13	13	14	15	17	18	19	20	22	23	24	25	26	28	29	30	47	49	52	54	57	60	62	97	90	53	71	451.56
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products	-2	-2	123	-51	-265	-153	-116	-135	-26	106	245	26	153	174	108	127	98	65	39	-75	-41	-72	-96	-67	-87	-146	-171	7096.73
H. Other																												
5. Waste	1763	1763	1770	1750	1749	1679	1598	1562	1485	1445	1516	1513	1548	1577	1589	1286	1276	1332	1322	1302	1260	1190	1187	1152	1123	1175	1153	-34.64
A. Solid waste disposal	1536	1536	1536	1517	1500	1418	1331	1290	1201	1125	1138	1073	1117	1042	1064	936	909	954	907	877	838	772	773	742	702	691	655	-57.34
B. Biological treatment of solid waste	50	50	57	62	70	74	78	90	104	139	196	254	246	339	342	171	177	198	225	217	239	234	226	229	235	289	301	497.93
C. Incineration and open burning of waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39.62
D. Waste water treatment and discharge	157	157	156	150	159	167	167	160	159	161	161	166	164	176	162	159	169	159	168	184	160	163	168	162	168	170	172	9.45
E. Other	19	19	20	21	20	20	22	22	21	20	21	20	20	20	21	19	20	21	21	24	23	20	20	18	18	24	24	21.88
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Memo items:																												
International bunkers	4784	4784	4311	4491	5897	6596	6869	6716	6365	6537	6375	6400	5727	4773	5019	4751	4938	5752	5978	5498	3829	4513	4618	4044	4397	4973	4983	4.15
Aviation	1748	1748	1607	1663	1637	1798	1841	1936	1989	2151	2279	2336	2384	2052	2135	2428	2560	2581	2652	2658	2323	2425	2497	2519	2496	2708	2652	51.75
Navigation	3036	3036	2703	2827	4260	4798	5027	4779	4376	4386	4096	4064	3343	2721	2884	2323	2378	3172	3326	2840	1506	2088	2121	1525	1901	2265	2331	-23.25
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
CO_2 emissions from biomass	4572	4572	4962	5208	5430	5376	5639	6021	6233	6183	6515	6837	7554	8039	9139	9876	10642	11027	12062	12293	12578	14898	14539	14900	15006	14874	15691	243.22
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O	7918	7918	7916	7567	7185	6997	6779	6524	6397	6371	6055	5867	5745	5507	5383	5461	5435	5175	5319	5544	5232	5090	5147	5012	5105	5019	5219	-34.08
Indirect CO_2 (3)	1217	1217	1259	1228	1206	1162	1138	1124	1048	1004	938	874	849	811	796	764	735	697	656	628	571	556	505	475	451	421	412	-66.11
Total CO_2 equivalent emissions without land use, land-use change and forestry	69139	69139	79793	73831	76179	80118	77145	90248	80776	76762	74283	69912	71517	71154	76151	70055	65636	73383	68787	65167	62341	62661	57478	52663	54542	50380	47919	-30.69
Total CO_2 equivalent emissions with land use, land-use change and forestry	74042	74042	84055	78826	80430	84074	81334	93644	84661	80828	78411	74120	76482	77219	81829	75393	70876	79012	71688	63233	64572	61864	55057	52411	55619	50524	52072	-29.67
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	70356	70356	81052	75059	77385	81280	78282	91372	81824	77766	75220	70786	72366	71965	76947	70819	66371	74081	69444	65795	62911	63217	57982	53138	54993	50801	48331	-31.31
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	75259	75259	85314	80054	81635	85236	82472	94768	85709	81832	79348	74994	77331	78031	82625	76158	71611	79709	72345	63861	65143	62420	55561	52886	56070	50945	52484	-30.26

TABLE 1(A): EMISSION TRENDS (CO_2) IN DENMARK (I.E. EU TERRITORY, WITHOUT GREENLAND AND THE FAROE ISLANDS)

CTF: Table 1

(cont.) Emission trends (CO2)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

CO_2 — Submission 2017 v2

(Sheet 2 of 6) — DENMARK

Denmark under the EU (i.e. without Greenland and the Faroe Islands)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	51677	51677	62210	56378	58665	62625	59416	72668	63138	59074	56501	52149	53795	53419	58648	53073	49487	57401	52619	49439	47546	47988	42806	38264	40182	35980	33722	-34.74
A. Fuel combustion (sectoral approach)	51336	51336	61560	55701	58083	62047	58962	72171	62440	58551	55395	51426	53025	52746	57979	52321	48939	56871	52075	49051	47284	47635	42554	38046	39938	35730	33475	-34.79
1. Energy industries	26150	26150	35020	30093	31668	35667	32160	44468	35338	31682	28591	25566	26855	27075	31819	25937	22735	30650	26023	23910	23860	23693	19726	16526	18781	15300	12668	-51.56
2. Manufacturing industries and construction	5394	5394	5926	5781	5639	5730	5839	5981	6022	6039	6127	5922	6027	5734	5702	5763	5458	5582	5299	4802	3992	4350	4271	3969	3866	3902	3830	-28.99
3. Transport	10576	10576	10992	11193	11300	11778	11918	12174	12347	12302	12323	12124	12116	12213	12665	12987	13102	13468	14078	13775	13053	12992	12644	12012	11813	11989	12192	15.27
4. Other sectors	9049	9049	9285	8438	9180	8558	8728	9301	8489	8246	8089	7617	7839	7539	7602	7292	7271	6942	6399	6357	6119	6394	5620	5324	5239	4309	4588	-49.30
5. Other	167	167	338	195	295	314	318	246	245	282	265	197	188	184	191	343	374	228	276	208	260	206	292	214	239	230	197	17.71
B. Fugitive emissions from fuels	341	341	649	677	582	578	453	498	697	523	1106	723	770	674	669	752	548	531	543	387	261	353	252	217	244	250	247	-27.48
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	341	341	649	677	582	578	453	498	697	523	1106	723	770	674	669	752	548	531	543	387	261	353	252	217	244	250	247	-27.48
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Industrial processes	1278	1278	1470	1601	1608	1646	1642	1757	1816	1862	1844	1860	1849	1868	1729	1849	1795	1811	1812	1513	1061	1008	1181	1177	1188	1207	1226	-4.07
A. Mineral industry	1082	1082	1258	1381	1398	1419	1418	1525	1599	1632	1609	1629	1626	1667	1539	1657	1563	1615	1614	1332	886	804	993	994	996	1021	1052	-2.75
B. Chemical industry	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	82.82
C. Metal industry	30	30	30	30	36	34	39	35	35	43	43	41	47	0	0	0	16	0	0	0	0	0	0	0	0	0	0	-99.43
D. Non-energy products from fuels and solvent use	165	165	180	189	173	193	184	195	181	186	191	189	174	199	189	190	214	195	196	179	173	202	186	181	191	184	172	4.29
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	352.72
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	619	619	512	403	350	412	537	418	483	264	274	268	207	237	229	160	222	196	194	231	187	156	165	192	246	240	177	-71.31
A. Enteric fermentation																												
B. Manure management																												
C. Rice cultivation																												
D. Agricultural soils																												
E. Prescribed burning of savannas																												
F. Field burning of agricultural residues																												
G. Liming	565	565	463	357	307	367	496	393	470	252	265	261	201	233	226	158	220	194	192	229	181	153	162	188	244	238	166	-70.72
H. Urea application	15	15	12	13	13	18	15	9	4	4	3	2	2	1	1	1	0	1	1	0	2	1	1	1	1	1	1	-90.50
I. Other carbon-containing fertilizers	38	38	37	33	30	27	26	16	10	7	6	5	4	3	2	1	2	1	1	2	4	3	3	2	2	2	10	-72.68
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry [2]	4856	4856	4215	4946	4200	3903	4136	3341	3828	4008	4068	4146	4901	6000	5611	5269	5169	5556	2827	-2010	2154	-876	-2502	-338	989	57	4059	-16.41
A. Forest land	-585	-585	-586	-588	-590	-592	-594	-596	-598	-600	-603	-605	596	557	518	479	512	471	-2639	-6564	-1559	-3791	-5831	-4103	-2476	-4023	176	-130.06
B. Cropland	4412	4412	3659	4577	4059	3670	3912	3090	3443	3541	3511	3825	3254	4364	4089	3761	3540	3972	4421	3629	2759	2008	2419	2545	2270	3003	2597	-41.12
C. Grassland	918	918	913	901	901	885	844	876	881	852	822	807	796	792	787	784	867	890	865	877	856	845	862	1129	1158	1129	1350	47.02
D. Wetlands	101	101	92	92	79	76	71	86	107	87	70	69	77	88	83	89	108	110	91	72	86	78	85	66	39	47	41	-59.54
E. Settlements	13	13	14	15	16	17	18	19	21	22	23	24	25	26	27	28	45	47	49	52	54	56	59	93	86	48	67	421.35
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products	-2	-2	123	-51	-265	-153	-116	-135	-26	106	245	26	153	174	108	127	98	65	39	-75	-41	-72	-96	-67	-87	-146	-171	7096.73
H. Other																												
5. Waste	18	18	18	19	18	18	20	20	19	18	19	18	18	18	19	18	18	19	19	21	21	18	18	16	16	21	21	21.30
A. Solid waste disposal	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
B. Biological treatment of solid waste																												
C. Incineration and open burning of waste	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Waste water treatment and discharge																												
E. Other	18	18	18	19	18	18	20	20	19	18	19	18	18	18	19	18	18	19	19	21	21	18	18	16	16	21	21	21.30
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Memo items:																												
International bunkers	4743	4743	4273	4452	5847	6539	6810	6658	6310	6480	6319	6344	5676	4731	4974	4708	4893	5701	5925	5449	3794	4472	4575	4006	4356	4927	4938	4.10
Aviation	1731	1731	1591	1647	1621	1780	1823	1917	1969	2130	2256	2312	2360	2032	2113	2403	2534	2555	2625	2632	2300	2401	2472	2493	2471	2681	2626	51.72
Navigation	3012	3012	2682	2805	4226	4760	4987	4741	4341	4351	4064	4032	3316	2699	2861	2305	2359	3146	3299	2817	1494	2071	2104	1513	1886	2247	2312	-23.25
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
CO_2 emissions from biomass	4572	4572	4962	5208	5430	5376	5639	6021	6233	6183	6515	6837	7554	8039	9139	9876	10642	11027	12062	12293	12578	14898	14539	14900	15006	14874	15691	243.22
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Indirect N_2O																												
Indirect CO_2 [3]	1217	1217	1259	1228	1206	1162	1138	1124	1048	1004	938	874	849	811	796	764	735	697	656	628	571	556	505	475	451	421	412	-66.11
Total CO_2 equivalent emissions without land use, land-use change and forestry	53591	53591	64210	58402	60641	64701	61615	74863	65455	61217	58637	54296	55870	55542	60625	55100	51522	59428	54644	51204	48815	49170	44170	39648	41632	37449	35147	-34.42
Total CO_2 equivalent emissions with land use, land-use change and forestry	58447	58447	68424	63348	64841	68605	65751	78203	69283	65225	62704	58442	60771	61542	66237	60368	56691	64983	57471	49194	50969	48295	41668	39311	42622	37506	39205	-32.92
Total CO_2 equivalent emissions, including indirect CO2, without land use, land-use change and forestry	54808	54808	65469	59630	61847	65863	62752	75987	66504	62222	59575	55170	56719	56353	61421	55864	52257	60125	55300	51832	49385	49727	44674	40123	42083	37871	35559	-35.12
Total CO_2 equivalent emissions, including indirect CO2, with land use, land-use change and forestry	59664	59664	69683	64576	66047	69767	66888	79327	70331	66229	63642	59316	61620	62353	67032	61133	57426	65681	58127	49822	51540	48851	42173	39785	43073	37928	39618	-33.60

TABLE 1(B): EMISSION TRENDS (CH_4) IN DENMARK (I.E. EU TERRITORY, WITHOUT GREENLAND AND THE FAROE ISLANDS)

CTF: Table 1
(cont.) Emission trends (CH4)
CRF: TABLE 10 EMISSION TRENDS
CH_4
(Sheet 3 of 6)
Denmark under the EU (i.e. without Greenland and the Faroe Islands)

Inventory 2015
Submission 2017 v2
DENMARK

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year(1)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	14.58	14.58	17.38	18.10	20.11	23.38	29.19	33.76	34.87	35.67	38.02	36.27	37.39	36.35	35.73	36.35	34.06	32.35	30.24	29.01	25.56	27.66	23.46	19.03	17.44	14.99	14.60	0.17
A. Fuel combustion (sectoral approach)	9.67	9.67	10.69	11.28	13.38	16.47	22.27	26.43	26.02	27.31	27.00	26.40	27.21	26.67	26.27	26.08	24.45	23.06	21.50	21.13	19.09	21.36	18.19	14.40	13.14	10.69	10.54	9.02
1. Energy industries	0.63	0.63	0.97	1.37	2.99	6.08	11.42	14.59	13.91	15.30	15.40	14.69	15.57	15.14	14.40	14.08	12.44	11.53	9.60	10.12	8.84	11.01	9.22	6.39	5.62	4.02	3.41	441.92
2. Manufacturing industries and construction	0.33	0.33	0.35	0.33	0.34	0.34	0.40	0.77	0.77	0.87	0.86	1.07	1.13	1.03	1.00	1.01	0.89	0.74	0.52	0.57	0.52	0.59	0.54	0.39	0.34	0.40	0.52	56.23
3. Transport	2.27	2.27	2.37	2.39	2.37	2.36	2.28	2.21	2.14	2.07	1.96	1.83	1.72	1.62	1.54	1.44	1.33	1.22	1.12	0.95	0.81	0.73	0.65	0.57	0.51	0.47	0.44	-80.74
4. Other sectors	6.35	6.35	6.90	7.10	7.58	7.59	8.06	8.76	9.09	8.97	8.69	8.71	8.70	8.79	9.24	9.46	9.71	9.51	10.20	9.45	8.89	9.00	7.76	7.04	6.65	5.79	6.16	-3.02
5. Other	0.08	0.08	0.10	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	-87.86
B. Fugitive emissions from fuels	4.90	4.90	6.69	6.82	6.73	6.92	6.92	7.33	8.85	8.36	11.01	9.87	10.18	9.68	9.46	10.27	9.61	9.29	8.74	7.88	6.47	6.31	5.27	4.63	4.30	4.29	4.06	-17.28
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	4.90	4.90	6.69	6.82	6.73	6.92	6.92	7.33	8.85	8.36	11.01	9.87	10.18	9.68	9.46	10.27	9.61	9.29	8.74	7.88	6.47	6.31	5.27	4.63	4.30	4.29	4.06	-17.28
C. CO_2 transport and storage																												
2. Industrial processes	0.10	0.10	0.09	0.11	0.09	0.09	0.10	0.12	0.14	0.12	0.12	0.14	0.12	0.16	0.18	0.16	0.15	0.18	0.13	0.12	0.12	0.10	0.09	0.13	0.13	0.11	0.16	59.60
A. Mineral industry																												
B. Chemical industry	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	58.93
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use	0.09	0.09	0.08	0.10	0.08	0.07	0.09	0.10	0.12	0.10	0.11	0.12	0.10	0.14	0.16	0.14	0.13	0.16	0.11	0.10	0.10	0.08	0.07	0.11	0.12	0.09	0.14	59.70
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	223.41	223.41	227.97	230.99	237.22	232.66	233.22	234.38	231.95	236.22	229.10	228.75	235.48	236.13	235.73	233.53	227.30	222.97	225.93	223.45	222.20	225.30	223.17	223.53	222.25	223.62	220.97	-1.09
A. Enteric fermentation	161.58	161.58	162.81	160.75	162.97	159.12	158.70	158.62	153.16	153.30	147.39	145.23	148.13	145.83	144.16	139.84	139.33	139.37	142.59	143.86	143.83	145.23	143.70	146.97	147.87	148.43	146.69	-9.22
B. Manure management	61.74	61.74	65.07	70.16	74.16	73.45	74.42	75.66	78.67	82.78	81.57	83.40	87.22	90.19	91.43	93.54	87.82	83.45	83.21	79.47	78.23	79.97	79.37	76.44	74.25	75.06	74.16	20.11
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Field burning of agricultural residues	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.11	0.14	0.13	0.13	0.13	0.11	0.13	0.14	0.14	0.14	0.13	0.12	0.14	0.10	0.10	0.11	0.12	0.12	0.12	37.71
G. Liming																												
H. Urea application																												
I. Other carbon-containing fertilizers																												
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry	0.76	0.76	0.80	0.87	0.94	1.00	1.07	1.14	1.21	1.28	1.34	1.41	1.48	1.55	1.61	1.71	1.75	1.82	1.89	1.96	2.03	2.06	2.14	2.32	2.38	2.30	2.41	218.56
A. Forest land	0.19	0.19	0.21	0.27	0.32	0.37	0.42	0.47	0.52	0.58	0.63	0.68	0.73	0.78	0.83	0.91	0.94	0.99	1.04	1.09	1.14	1.15	1.15	1.15	1.15	1.15	1.17	524.31
B. Cropland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.06	0.15	0.17	0.07	0.19	100.00
C. Grassland	0.54	0.54	0.53	0.53	0.52	0.51	0.51	0.50	0.49	0.49	0.48	0.48	0.47	0.46	0.46	0.45	0.44	0.44	0.43	0.43	0.42	0.42	0.41	0.47	0.49	0.50	0.48	-10.96
D. Wetlands	0.03	0.03	0.05	0.08	0.10	0.12	0.14	0.17	0.19	0.21	0.23	0.25	0.28	0.30	0.32	0.34	0.37	0.39	0.42	0.44	0.47	0.49	0.52	0.55	0.56	0.58	0.58	1708.49
E. Settlements	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products																												
H. Other																												
5. Waste	66.89	66.89	67.12	66.49	66.06	62.97	59.54	58.34	55.25	52.42	53.41	51.13	52.84	50.31	51.55	46.16	45.35	47.53	46.10	44.60	43.51	40.83	40.69	39.61	38.20	39.16	38.21	-42.87
A. Solid waste disposal	61.45	61.45	61.45	60.67	60.00	56.73	53.25	51.59	48.02	45.01	45.53	42.91	44.68	41.68	42.54	37.46	36.37	38.14	36.29	35.09	33.50	30.88	30.92	29.70	28.09	27.65	26.22	-57.34
B. Biological treatment of solid waste	1.53	1.53	1.75	1.89	2.14	2.27	2.27	2.69	3.10	3.30	3.71	4.03	3.95	4.42	4.77	4.47	4.72	5.12	5.52	5.22	5.69	5.61	5.41	5.53	5.70	7.03	7.52	391.11
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.62
D. Waste water treatment and discharge	3.83	3.83	3.84	3.84	3.85	3.89	3.94	3.98	4.04	4.03	4.08	4.12	4.13	4.14	4.15	4.15	4.19	4.18	4.20	4.19	4.23	4.26	4.28	4.31	4.34	4.38	4.37	14.22
E. Other	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.10	0.10	27.14
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Total CH_4 emissions without CH_4 from LULUCF	304.97	304.97	312.56	315.70	323.49	319.09	322.06	326.60	322.20	324.43	320.65	316.29	325.84	322.95	323.19	316.19	306.85	303.03	302.41	297.17	291.39	293.89	287.41	282.30	278.02	277.87	273.94	-10.18
Total CH_4 emissions with CH_4 from LULUCF	305.73	305.73	313.36	316.56	324.43	320.10	323.13	327.74	323.40	325.70	321.99	317.70	327.31	324.49	324.80	317.90	308.60	304.85	304.30	299.14	293.42	295.95	289.55	284.61	280.40	280.17	276.35	-9.61
Memo items:																												
International bunkers	0.07	0.07	0.07	0.07	0.10	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.07	0.07	0.06	0.06	0.08	0.09	0.08	0.04	0.06	0.06	0.04	0.05	0.06	0.07	-8.31
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.26
Navigation	0.06	0.06	0.06	0.06	0.09	0.10	0.11	0.10	0.10	0.10	0.09	0.09	0.08	0.06	0.07	0.05	0.06	0.08	0.08	0.07	0.04	0.05	0.05	0.04	0.05	0.06	0.06	-9.34
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
CO_2 emissions from biomass																												
CO_2 captured																												
Long-term storage of C in waste disposal sites																												
Indirect N_2O																												
Indirect CO_2 (3)																												

TABLE 1(C): EMISSION TRENDS (N_2O) IN DENMARK (I.E. EU TERRITORY, WITHOUT GREENLAND AND THE FAROE ISLANDS)

CTF: Table 1

(cont.) Emission trends (N2O)

CRF: TABLE 10 EMISSION TRENDS — Inventory 2015

N_2O — Submission 2017 v2

(Sheet 4 of 6) — DENMARK

Denmark under the EU (i.e. without Greenland and the Faroe Islands)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[(1)]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
1. Energy	1.21	1.21	1.52	1.50	1.47	1.51	1.49	1.65	1.70	1.56	1.88	1.62	1.67	1.60	1.65	1.65	1.49	1.57	1.56	1.45	1.33	1.45	1.32	1.26	1.31	1.27	1.31	7.86
A. Fuel combustion (sectoral approach)	1.03	1.03	1.16	1.13	1.15	1.19	1.25	1.38	1.31	1.28	1.26	1.22	1.24	1.24	1.28	1.23	1.20	1.28	1.26	1.24	1.20	1.26	1.20	1.15	1.17	1.14	1.16	12.59
1. Energy industries	0.29	0.29	0.37	0.34	0.36	0.39	0.38	0.51	0.44	0.42	0.40	0.38	0.40	0.40	0.44	0.39	0.35	0.42	0.36	0.35	0.36	0.38	0.33	0.31	0.33	0.29	0.28	-4.14
2. Manufacturing industries and construction	0.19	0.19	0.21	0.21	0.19	0.19	0.24	0.24	0.24	0.25	0.25	0.24	0.24	0.22	0.21	0.22	0.21	0.23	0.23	0.22	0.17	0.19	0.18	0.16	0.15	0.15	0.15	-24.18
3. Transport	0.34	0.34	0.35	0.36	0.37	0.39	0.40	0.40	0.41	0.40	0.40	0.39	0.38	0.38	0.38	0.37	0.36	0.35	0.37	0.38	0.37	0.38	0.40	0.41	0.41	0.43	0.45	33.02
4. Other sectors	0.21	0.21	0.22	0.21	0.22	0.22	0.22	0.23	0.22	0.21	0.21	0.21	0.23	0.23	0.24	0.24	0.26	0.27	0.29	0.29	0.29	0.30	0.27	0.27	0.27	0.25	0.29	35.55
5. Other	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	45.37
B. Fugitive emissions from fuels	0.18	0.18	0.36	0.37	0.32	0.31	0.24	0.27	0.39	0.28	0.62	0.40	0.43	0.37	0.37	0.42	0.30	0.29	0.29	0.21	0.14	0.19	0.12	0.11	0.14	0.13	0.14	-19.62
1. Solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
2. Oil and natural gas and other emissions from energy production	0.18	0.18	0.36	0.37	0.32	0.31	0.24	0.27	0.39	0.28	0.62	0.40	0.43	0.37	0.37	0.42	0.30	0.29	0.29	0.21	0.14	0.19	0.12	0.11	0.14	0.13	0.14	-19.62
C. CO_2 transport and storage																												
2. Industrial processes	3.42	3.42	3.14	2.78	2.63	2.66	2.98	2.76	2.80	2.67	3.14	3.31	2.92	2.57	2.96	1.79	0.06	0.07	0.08	0.06	0.08	0.06	0.07	0.05	0.06	0.06	0.07	-98.05
A. Mineral industry																												
B. Chemical industry	3.36	3.36	3.08	2.72	2.56	2.60	2.92	2.69	2.74	2.60	3.07	3.24	2.86	2.50	2.89	1.71	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	
C. Metal industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
D. Non-energy products from fuels and solvent use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	234.56
E. Electronic industry																												
F. Product uses as ODS substitutes																												
G. Other product manufacture and use	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.06	0.07	0.08	0.06	0.07	0.06	0.07	0.05	0.06	0.06	0.07	9.76
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
3. Agriculture	21.57	21.57	20.96	20.48	19.97	19.62	19.17	18.06	18.08	18.50	17.83	17.59	17.22	17.33	16.52	16.73	16.39	15.96	16.47	16.36	15.65	15.23	15.38	15.08	15.02	15.33	15.43	-28.48
A. Enteric fermentation																												
B. Manure management	3.28	3.28	3.31	3.41	3.39	3.26	3.14	3.14	3.18	3.29	3.20	3.19	3.30	3.38	3.34	3.45	3.25	3.02	3.01	2.83	2.67	2.66	2.61	2.55	2.52	2.50	2.46	-25.18
C. Rice cultivation																												
D. Agricultural soils	18.28	18.28	17.65	17.07	16.58	16.36	16.02	14.92	14.90	15.21	14.63	14.40	13.92	13.94	13.18	13.27	13.13	12.93	13.46	13.53	12.98	12.56	12.77	12.53	12.49	12.83	12.97	-29.07
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
F. Field burning of agricultural residues	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.71
G. Liming																												
H. Urea application																												
I. Other carbon containing fertlizers																												
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
4. Land use, land-use change and forestry	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.11	24.41
A. Forest land	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-11.43
B. Cropland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	8727.24
C. Grassland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	10901.52
D. Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-49.87
E. Settlements	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	3794.46
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
G. Harvested wood products																												
H. Other																												
5. Waste	0.25	0.25	0.25	0.23	0.27	0.29	0.30	0.28	0.29	0.39	0.54	0.73	0.70	1.01	0.94	0.38	0.41	0.42	0.51	0.56	0.51	0.51	0.51	0.49	0.51	0.59	0.59	139.03
A. Solid waste disposal																												
B. Biological treatment of solid waste	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.08	0.09	0.19	0.35	0.51	0.50	0.77	0.75	0.20	0.20	0.24	0.29	0.29	0.33	0.31	0.30	0.30	0.31	0.38	0.38	836.61
C. Incineration and open burning of waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.62
D. Waste water treatment and discharge	0.21	0.21	0.20	0.18	0.21	0.23	0.23	0.20	0.20	0.20	0.20	0.21	0.20	0.24	0.19	0.18	0.22	0.18	0.21	0.27	0.18	0.19	0.20	0.18	0.20	0.20	0.21	2.01
E. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Total direct N_2O emissions without N_2O from LULUCF	26.45	26.45	25.87	24.99	24.34	24.08	23.94	22.75	22.87	23.12	23.39	23.24	22.52	22.51	22.08	20.55	18.36	18.01	18.61	18.43	17.57	17.24	17.29	16.89	16.90	17.25	17.39	-34.26
Total direct N_2O emissions with N_2O from LULUCF	26.54	26.54	25.96	25.08	24.43	24.17	24.03	22.84	22.96	23.21	23.48	23.33	22.61	22.60	22.17	20.64	18.45	18.10	18.70	18.52	17.66	17.33	17.38	16.98	17.00	17.35	17.50	-34.05
Memo items:																												
International bunkers	0.13	0.13	0.12	0.13	0.16	0.18	0.19	0.18	0.18	0.18	0.18	0.18	0.16	0.14	0.14	0.14	0.14	0.16	0.17	0.16	0.12	0.13	0.14	0.12	0.13	0.15	0.15	10.47
Aviation	0.06	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.07	0.07	0.08	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.09	0.09	54.82
Navigation	0.08	0.08	0.07	0.07	0.11	0.12	0.13	0.12	0.11	0.11	0.10	0.10	0.08	0.07	0.07	0.06	0.06	0.08	0.08	0.07	0.04	0.05	0.05	0.04	0.05	0.06	0.06	-23.06
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
CO_2 emissions from biomass																												
CO_2 captured																												
Long-term storage of C in waste disposal sites																												
Indirect N_2O	26.57	26.57	26.57	25.39	24.11	23.48	22.75	21.89	21.47	21.38	20.32	19.69	19.28	18.48	18.06	18.32	18.24	17.37	17.85	18.60	17.56	17.08	17.27	16.82	17.13	16.84	17.51	-34.08
Indirect CO_2[(3)]																												

TABLE 1(D): EMISSION TRENDS (HFCS, PFCS, SF_6 AND NF_3) IN DENMARK (I.E. EU TERRITORY, WITHOUT GREENLAND AND THE FAROE ISLANDS)

CTF: Table 1

(cont.) Emission trends (HFCs, PFCs, SF6 and NF3)

CRF: TABLE 10 EMISSION TRENDS Inventory 2015

HFCs, PFCs, SF_6, and NF_3 Submission 2017 v2

(Sheet 5 of 6) DENMARK

Denmark under the EU (i.e. without Greenland and the Faroe Islands)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change from base to latest reported year
	(kt)																											%
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	3.69	102.29	146.40	242.09	381.96	381.55	486.93	597.73	726.10	763.57	808.04	836.64	895.82	951.41	978.95	1010.54	1011.37	971.18	969.09	902.15	813.21	791.79	710.34	638.88	100.00
Emissions of HFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	3.69	102.29	146.34	241.46	379.86	376.35	475.46	581.99	703.54	735.66	780.03	812.05	875.28	932.64	957.80	989.36	992.93	951.20	950.42	886.47	801.04	780.95	701.67	633.93	100.00
HFC-23	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NO,NA	0.00	NO,NA	0.00
HFC-32	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	100.00
HFC-41	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-43-10mee	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-125	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.05	100.00
HFC-134	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-134a	NO,NA	NO,NA	NO,NA	0.00	0.07	0.10	0.15	0.21	0.18	0.22	0.23	0.26	0.27	0.29	0.28	0.29	0.29	0.29	0.30	0.29	0.26	0.27	0.26	0.23	0.23	0.18	0.16	100.00
HFC-143	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-143a	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.04	100.00
HFC-152	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-152a	NO,NA	NO,NA	NO,NA	0.00	0.03	0.05	0.04	0.03	0.02	0.01	0.04	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	100.00
HFC-161	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-227ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-236cb	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-236ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-236fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-245ca	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-245fa	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
HFC-365mfc	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Unspecified mix of HFCs[4] - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.44	3.50	7.20	9.79	12.38	17.04	20.10	21.21	20.83	21.50	22.32	23.06	24.17	28.98	31.18	30.87	32.09	34.47	36.33	40.07	45.28	100.00
Emissions of PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.07	0.63	2.09	5.20	11.47	15.74	22.57	27.91	28.01	24.59	20.53	18.77	21.15	21.19	18.44	19.98	18.66	15.68	12.18	10.84	8.66	4.95	100.00
CF_4	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NO,NA	0.00
C_2F_6	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
C_3F_8	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
C_4F_{10}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
$c-C_4F_8$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NO,NA	0.00	NO,NA	0.00
C_5F_{12}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
C_6F_{14}	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
$C_{10}F_{18}$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
$c-C_3F_6$	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Unspecified mix of PFCs[4] - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
Emissions of SF_6 - (kt CO_2 equivalent)	42.41	42.41	60.58	85.05	96.51	116.44	102.40	58.15	69.70	56.69	61.92	56.07	28.12	23.44	29.52	30.76	19.90	33.49	28.11	29.31	34.17	35.76	69.39	112.00	130.58	132.37	103.08	143.07
SF_6	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	143.07
Emissions of NF_3 - (kt CO_2 equivalent)	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00
NF_3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00

TABLE 2(A): DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: BASE YEAR

Table 2(a)		
Description of quantified economy-wide emission reduction target: base year [a]		
Party	Denmark*	
Base year /base period	1990*	
	% of base year/base period	% of 1990 [b]
Emission reduction target	20 *	20 *
Period for reaching target	Base year - 2020*	

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Optional.

* Under the assumption that Denmark's quantified economy-wide emission reduction target is Denmark's commitment as part of the joint target for the EU and its 28 Member States. As the Faroe Islands and Greenland are not included in the EU territory, the commitments of Denmark as a member of the EU do not apply to the Faroe Island and Greenland.

Legally binding target trajectories for the period 2013-2020 are enshrined in both the EU-ETS Directive (Directive 2003/87/EC and respective amendments) and the Effort Sharing Decision (Decision No 406/2009/EC). These legally binding trajectories not only result in a 20% GHG reduction in 2020 compared to 1990 but also define the EU's annual target pathway to reduce EU GHG emissions from 2013 to 2020. The Effort Sharing Decision sets annual national emission targets for all Member States for the period 2013-2020 for those sectors not covered by the EU emissions trading system (ETS), expressed as percentage changes from 2005 levels. In March 2013 and August 2017, the Commission formally adopted, respectively revised for 2017-2020, the national annual limits throughout the period for each Member State. By 2020, the national targets will collectively deliver a reduction of around 10% in total EU emissions from the sectors covered compared with 2005 levels. The emission reduction to be achieved from the sectors covered by the EU ETS will be 21% below 2005 emission levels.

TABLE 2(B): DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: GASES AND SECTORS COVERED

Table 2(b)

Description of quantified economy-wide emission reduction target: gases and sectors covered [a]

Gases covered		Base year for each gas (year):
CO2	Yes	1990
CH4	Yes	1990
N2O	Yes	1990
HFCs	Yes	1990
PFCs	Yes	1990
SF6	Yes	1990
NF3	No	NA
Other gases	No	NA
Sectors covered [b]		
Energy	Yes	
Transport [c]	Yes	
Industrial processes [d]	Yes	
Agriculture	Yes	
LULUCF	No	
Waste	Yes	
Other (specify)	Aviation: Yes*	

Abbreviations: LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] More than one selection will be allowed. If Parties use sectors other than those indicated above, the explanation of how these sectors relate to the sectors defined by the IPCC should be provided.

[c] Transport is reported as a subsector of the energy sector.

[d] Industrial processes refer to the industrial processes and solvent and other product use sectors.

* In principle, the EU ETS should cover CO2 emissions of all flights arriving at, and departing from, airports in all EU Member States, Norway, Iceland and Liechtenstein and closely related territories. However, since 2012, flights to and from aerodromes from other countries have not been included in the EU ETS.This exclusion was taken in order to facilitate negotiation of a global agreement to address aviation emissions in the forum of the International Civil Aviation Organisation (ICAO). The EU has decided on a reduced scope in the 2013–2016 period (Regulation (EU) No 421/2014 of the European Parliament and of the Council of 16 April 2014).

It should be noted that only CO2 from aviation is included, and that it is only relevant to include these emissions reported by aviation entities on the level of EU total CO2 emissions from aviation under the EU ETS as CO2-emissions from aviation entities registered in the Danish quota register (based on fuel used by these entities) are different from CO2 emissions from domestic and international aviation reported by Denmark under the UNFCCC (based on fuel sold to aircrafts starting from Danish airports). However, in accordance with guidance from the European Commission, the latter is included in table 4 as a proxy for the former.

TABLE 2(C): DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: GLOBAL WARMING POTENTIAL VALUES (GWP)

Table 2(c)	
Description of quantified economy-wide emission reduction target: global warming potential values (GWP) [a]	
Gases	GWP values [b]
CO2	AR4*
CH4	AR4*
N2O	AR4*
HFCs	AR4*
PFCs	AR4*
SF6	AR4*
NF3	NA
Other gases [c]	NA

Abbreviations: GWP = global warming potential

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Please specify the reference for the GWP: Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) or the Fourth Assessment Report of the IPCC.

[c] Specify.

* as adopted in UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation.

TABLE 2(D): DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: APPROACH TO COUNTING EMISSIONS AND REMOVALS FROM THE LULUCF SECTOR

Table 2(d)			
Description of quantified economy-wide emission reduction target: approach to counting emissions and removals from the LULUCF sector [a]			
Role of LULUCF	LULUCF in base year level and target	Included	
		Excluded	Excluded
	Contribution of LULUCF is calculated using	Land-based approach	NA
		Activity-based approach	NA
		Other (specify)	NA

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

TABLE 2(E)I: DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: MARKET-BASED MECHANISMS UNDER THE CONVENTION

Table 2(e)I

Description of quantified economy-wide emission reduction target: market-based mechanisms under the Convention [a]

	Possible scale of contributions (estimated kt CO2 eq)
CERs	NE*
ERUs	NE**
AAUs [b]	NE***
Carry-over units [c]	NO****
Other mechanism units under the Convention (specify) [d]	NA*****

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] AAUs issued to or purchased by a Party.

[c] Units carried over from the first to the second commitment periods of the Kyoto Protocol, as described in decision 13/CMP.1 and consistent with decision XX /CMP.8.

[d] As indicated in paragraph 5(e) of the guidelines contained in annex I of decision 2/CP.17.

* The use of these units under the ETS Directive and the Effort Sharing Decision is subject to the limits specified above which do not separate between CERs and ERUs, but include additional criteria for the use of CERs.

** The use of these units under the ETS Directive and the Effort Sharing Decision is subject to the limits specified above which do not separate between CERs and ERUs, but include additional criteria for the use of CERs.

*** AAUs for the period 2013-2020 have not yet been determined. The EU expects to achieve its 20% target for the period 2013-2020 with the implementation of the ETS Directive and the ESD Decision in the non-ETS sectors which do not allow the use of AAUs from non-EU Parties.

**** The time-period of the Convention target is from 1990-2020, no carry-over units will be used to achieve the 2020 target.

***** There are general provisions in place in the EU legislation that allow for the use of such units provided that the necessary legal arrangements for the creation of such units have been put in place in the EU which is not the case at the point in time of the provision of this report.

The 2020 Climate and Energy Package allows Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) to be used for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. In addition, the legislation foresees the possible recognition of units from new market mechanisms. Under the EU ETS the limit does not exceed 50% of the required reduction below 2005 levels. In the sectors not covered by the ETS, annual use shall not exceed to 3 % of each Member States' non-ETS greenhouse gas emissions in 2005. A limited number of Member States may use an additional 1%, from projects in LDCs or SIDS subject to conditions.

TABLE 2(E)II: DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: OTHER MARKET-BASED MECHANISMS

Table 2(e)II	
Description of quantified economy-wide emission reduction target: other market-based mechanisms [a]	
	Possible scale of contributions
(Specify)	(estimated kt CO_2 eq)
NA	None

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

TABLE 2(F): DESCRIPTION OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: ANY OTHER INFORMATION

Table 2(f)
Description of quantified economy-wide emission reduction target: any other information [a,b]
In December 2009, the European Council reiterated the conditional offer of the EU to move to a 30% reduction by 2020 compared to 1990 levels as part of a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.
[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets. [b] This information could include information on the domestic legal status of the target or the total assigned amount of emission units for the period for reaching a target. Some of this information is presented in the narrative part of the biennial report.

TABLE 3: PROGRESS IN ACHIEVEMENT OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET: INFORMATION ON MITIGATION ACTIONS AND THEIR EFFECTS (PLEASE GO TO THE ELECTRONIC VERSION OF THE CTF FOR THE TABLE WITH DENMARK'S PORTFOLIO OF PAMS)

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact 2020	Estimate of mitigation impact 2030	Source of estimates
TD-1b: Mineral-oil Tax Act	Yes*	Energy, Transport	CO_2, CH_4, N_2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	Tax on mineral oil products in Denmark. The Mineral-oil Tax Act entered into force on 1 January 1993. Before this, the tax on petrol was regulated via the Petrol Tax Act, which entered into force on 1 January 1983, and the Act on Taxation of Gas Oil and Diesel Oil, Heating Oil, Heating Tar, and Crude Oil was regulated via the Act on Taxation of certain Oil Products, which entered into force on 3 October 1977. Tax rates from recent years are shown in Table 4.6. From 1 June 1999 a tax differentiation between light diesel and diesel low in sulphur was introduced, to encourage the use of diesel low in sulphur, which is less polluting than light diesel. This was accomplished and a change took place soon after to the effect that almost all diesel sold was low in sulphur. The purpose of further differentiation from 1 January 2005 favouring sulphur-free diesel was likewise to encourage the use of this type of diesel in favour of diesel low in sulphur, and this has been successful. In addition, tax differentiation has been introduced in order to achieve environmental goals other than direct reductions in greenhouse gas emissions. Thus tax differentiation has been introduced with a view to phasing out lead in petrol. The rate of tax to achieve this environmental goal is shown in Table 4.7.	1993	Government:Ministry of Taxation	1200 and IE(G1 and G4)	1200 and IE(G1 and G4)	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
TD-2: Gas Tax Act	Yes*	Energy	CO_2, CH_4, N_2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	Tax on consumption of natural gas and town gas in Denmark.	1996	Government:Ministry of Taxation	IE (G1, G2 and G4)	IE (G1, G2 and G4)	
TD-3: Coal Tax Act	Yes*	Energy	CO_2, CH_4, N_2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	Tax rated after the calorific value of coal, coke, furnace coke, coke gravel, crude coke, lignite briquettes and lignite, tall oil, wood tar, vegetable pitch etc.	1982	Government:Ministry of Taxation	IE (G1, G2 and G4)	IE (G1, G2 and G4)	
TD-4: Electricity Tax	Yes*	Energy	CO_2, CH_4, N_2O	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	Tax on consumption of electricity. The electricity tax was introduced on 1 April 1977. With effect from 1 January 2013, the tax on electricity used for heating was reduced considerably, to take into account, that an increasing amount of renewable energy was being used in electricity production. It has been estimated that this will lead to an emission reduction outside the emissions trading scheme of 0.15 million tonnes CO_2 in 2015 and 0.29 million tonnes in 2018. Table 4.10 shows the development in electricity tax rates since 2002.	1977	Government:Ministry of Taxation	IE (G1, G2 and G4)	IE (G1, G2 and G4)	
TD-5: CO_2 tax on energy products	Yes*	Energy	CO_2	Demand management/reduction (Energy consumption)	Economic, Fiscal	Implemented	Tax on energy products depending on their contribution to CO_2 emissions. The CO_2 tax on energy products was introduced on 1 March 1992 and was imposed on different types of energy products relative to their CO_2 emissions. From 1 January 2010 a structural change in the CO_2 tax was implemented as an adaption to the EU Emissions Trading Scheme. The tax rate was increased to DKK 150 /tonne of CO_2 indexed as mentioned below, cf. table 4.11. Table 4.12 shows examples of the different types of CO_2 taxes converted into consumer units. In addition to this, there are CO_2 taxes on heating tar, crude oil, coke, crude oil coke, lignite briquettes and lignite, LPG, and other gases. As of 1 January 2008 the CO_2 taxes follow a yearly regulation of 1.8% in the period 2008-2015, similar to the energy taxes. From 2016 the tax is regulated with the consumer price index two years prior.	1992	Government:Ministry of Taxation	410 and IE (G1 and G4)	410 and IE (G1 and G4)	
TD-6: Green Owner Tax - a fuel-efficiency-dependent annual tax on motor vehicles	Yes*	Transport	CO_2, CH_4, N_2O	Demand management/reduction (Energy consumption), Low carbon fuels/electric cars (Transport)	Economic, Fiscal	Implemented	Car owners have to pay half-yearly taxes which are differentiated in accordance with the fuel efficiency of the cars, expressed in kilometres per litre. The energy consumption of electric cars is converted to a petrol fuel efficiency on the basis of the energy content of petrol.	1997	Government:Ministry of Taxation	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TD-7: Registration Tax - a fuel-efficiency-dependant registration tax on passenger cars and vans	Yes*	Transport	CO_2, CH_4, N_2O	Demand management/reduction (Energy consumption), Low carbon fuels/electric cars (Transport)	Economic, Fiscal	Implemented	The registration tax on motorised vehicles is calculated on basis of the value of the vehicle. It is furthermore integrated in the design of the registration tax that cars are granted deductions in the registration tax with reference to their specific energy efficiency and safety equipment. Cars with high energy efficiencies, such as electric vehicles, are granted large reductions in the registration tax. Electric vehicles are furthermore granted deductions in the registration tax until 2021. The deductions are given as percentage rebates on the total registration tax of the vehicle, after all other deductions, and is gradually phased in from 2016 to 2021. Furthermore a deduction dependant on battery capacity is given. Additionally, there is a fixed deduction in 2016-2019.	2000	Government:Ministry of Taxation	IE (G1 and G4)	IE (G1 and G4)	
TD-8: Tax on HFCs, PFCs and SF_6 - equivalent to the CO_2 tax	Yes*	Transport	HFCs, PFCs, SF_6	Reduction of emissions of fluorinated gases (Industrial processes)	Economic, Fiscal	Implemented	Tax on HFCs, SF_6 and PFCs. The tax is differentiated in accordance with the global warming potential of the substance with DKK 0.15 per kilogramme of CO_2 equivalents as the general principle and with DKK 600 per kilogramme as a general upper limit.	2001	Government:Ministry of Taxation	IE (G1 and G6)	IE (G1 and G6)	
TD-9: Tax on methane from natural gas fired power plants - equivalent to the CO_2 tax	Yes*	Energy	CH_4, CO_2	Reduction of losses (Energy supply), Control of fugitive emissions from energy production (Energy supply), Methane reduction ()	Economic, Fiscal	Implemented	Tax on methane emissions from natural gas fired power plants - equal in terms of CO_2 equivalents to the CO_2 tax. As of 1 January 2011 a tax on methane emissions - equal in terms of CO_2 equivalents to the CO_2 tax - from natural gas fired power plants was introduced. This is expected to reduce methane emissions from gas engines through behavioural changes such as changing from motor operation to boiler operation and establishing mitigation measures. Consumption is also expected to fall as the price of heat will increase. These behavioural changes will result in falls in the emissions of unburned methane from power stations. In addition, CO_2 emissions will fall and consumption of natural gas will fall. In total, a decline of 0.06 million tonnes CO_2 equivalent emissions in 2 out of 5 years is expected, corresponding to an average annual reduction effect of approximately 0.02 million tonnes CO_2 equivalent per year in 2008-12.	2011	Government:Ministry of Taxation	30	30	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact 2020	Estimate of mitigation impact 2030	Source of estimates
EN-1: EU-CO2-emission trading scheme for electricity and district heat production and certain industrial processes (incl. Business) and aviation from 2012	Yes*	Energy, Industry/Industrial processes, Cross-cutting	CO2	Switch to less carbon-intensive fuels (Energy supply), Increase in renewable energy (Energy supply), Efficiency improvement in the energy and transformation sector (Energy supply), Control of fugitive emissions from energy production (Energy supply)	Regulatory, Economic	Implemented	A key instrument for reaching the goals for emission reductions is the EU Emission Trading Scheme (EU ETS), which is a CO2 allowance scheme for energy production and energy-intensive industries as described in section 4.3.1. The EU Member States have devised this trading scheme for greenhouse gas emissions in order to fulfil the international climate commitments set out in the Kyoto Protocol, in particular with the aim of reducing CO2 emissions from energy production and energy-intensive industries. The allowances scheme entered into force on 1 January 2005. The 2005-2007 period was used as a testing phase. The EU ETS Directive has been revised a number of times. The allowance allocation for 2008-2012 was determined on the basis of the national allocation plan from July 2006, submitted the European Commission. The EU ETS 2008-2012 has been an important measure in Denmark's fulfilment of its climate obligations under the first commitment period of the Kyoto Protocol. The scheme aligns well with government policy for the energy area on liberalisation of the energy markets and management of environment efforts by the market. The installations subject to the allowance regulations account for a little less than half of Danish emissions of greenhouse gases. Almost all major Danish installations with considerable emissions are covered by the ETS. Most of these are generators of power and heat, the rest are industrial enterprises plus a few production units within the offshore sector. Both the statutory and the administrative basis for the scheme have been established. The necessary legal basis was adopted by the Danish Folketing in June 2004 and the 2008-2012 national allocation plan was approved by the European Commission on 31 August 2007. According to the national allocation plan for the period 2008-2012 an average annual allowance of 24.5 million tonnes CO2 has been allocated. According to the allocation plan this should correspond to a drop in annual emissions of about 5 million tonnes per year in 2008-2012, or a reduction of about 17% compared with emissions expected in the national allocation plan for the period. This level was set by balancing environmental considerations against competitiveness and jobs: • Electricity and heat producers were allocated about 15.8 million EAUs. The allowance for electricity generation is allocated as "per kWh", while for heat production allowances are allocated according to emissions in the base years 1998-2004. • The other 133 installations (industry and offshore) have been allocated allowances corresponding to emissions in the base years 1998-2004. A total of 8.2 million tonnes CO2 per year have been allocated to industry and offshore. • A special reserve of 0.5 million tonnes CO2 per year has been allocated with free allowances for new installations and significant extensions to existing units. Allowances not allocated by the end of the commitment period or returned due to closures have been auctioned. The period 2008 – 2012 was finalized in 2013 with the final surrendering of allowances and credits by companies participating in the EU ETS as shown in section 4.3.1. The new EU Climate and Energy Agreement from December 2008 extended the ETS system to 2013-2020 in order for the EU to reduce CO2 emissions by 20% in 2020. At the same time allocation was centralised and auctioning is to be used more extensively from 2013. The allowances have been calculated for this period in accordance with the EU benchmarking decision 2011/278/EU. Annex 1f contains an overview of the installations and aviation operators covered and their allowance allocation for 2013-2020. However, the current low allowances price has made it more difficult to initiate the necessary transition and green investments after 2012. Developments in allowances prices have particular significance for Danish emissions and they affect the need to initiate other, new mitigation initiatives. The low allowances price makes the situation relatively more expensive for countries like Denmark, who want to take the lead. Therefore, efforts to increase the level of ambition in EU climate policy are key in the Danish government's climate change policy to achieve the national target.	2005	Government:Danish Energy Agency and entities uner the EU ETS	IE (G1, G3 and G4)	IE (G1, G3 and G4)	
EN-2: Biomass Agreement (Agreement on the use of biomass in electricity production)	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic, Voluntary Agreement	Implemented	In 2015, biomass accounted for approximately 62% of renewable-energy production, mostly in the form of straw, wood pellets, wood chip and biodegradable waste for incineration. Approximately half of the biomass was imported, mainly in the form of wood pellets (32 PJ), biofuels (7 PJ), wood chips (6 PJ) and fire wood (3 PJ). The energy production from biomass has more than doubled since 1990 - primarily due to the policy agreement from 1993 (the Biomass Agreement: requires power plants to use 1.4 million tonnes of straw and wood, equivalent to almost 20 PJ per year) and the policy agreement from February 2008 on the increased use of straw and chips at the large co-generation plants (up to 700,000 tonnes in 2011). At the same time, the consumption of biomass continues to rise as a source of energy for the supply of heat in district-heating plants and in smaller installations for households, enterprises and institutions. Although it was demonstrated in Denmark in the mid-1990s that biogas plants can be established with reliable operation and with an acceptable economy biogas still only accounted for 3.3% of renewable-energy production in 2013. Liquid biofuels, such as animal and vegetable oils, biodiesel and bioethanol, is used only on a small scale. Liquid biofuels from bio-waste by the so-called second generation technologies are now at a low level.	1993	Government:The electricity producers	1100 and IE (G1 and G3)	1100 and IE (G1 and G3)	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
EN-3: Price supplement and subsidies for renewable energy production	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic	Implemented	The increasing use of renewable energy sources is reducing emissions of CO2 from fossil fuels. The long term goal for the Danish government is to be independent of fossil fuels by 2050. The initiatives in the political energy agreement concluded by the government and a broad majority in the Parliament in March 2012 cover these crucial energy policy areas for the period until 2020. The parties to the current energy agreement have agreed by 2018 to commence discussions on additional initiatives for the period after 2020. The expected headline results for 2020 are the following: more than 40% renewable energy in final energy consumption; approximately 50% of electricity consumption to be supplied by wind power; approximately 8% reduction in gross energy consumption in relation 2010; and 34% reduction in greenhouse gas emissions in relation to 1990. Renewable energy sources are promoted with economic measures, including use of energy and CO2 taxes on fossil fuels and through the Public Service Obligation Schemes (PSO), which have been a supplement to the price of electricity paid by all consumers until 2017. The Danish PSO levy will be phased out during a period of 5 years (2017-2022), and the financing of support to renewables will gradually shift to the State Budget.	2008	Government:Danish Energy Agency and entities responsible for energy production	IE (G1 and G3)	IE (G1 and G3)	
EN-4: Tenders for offshore wind turbines	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Regulatory	Implemented	In accordance with the energy policy agreement from February 2008, the expansion of wind power since the Fifth National Communication in December 2009 has included a tender for and construction of a 400 MW offshore wind farm at the island of Anholt. This wind farm started to operate in September 2013. The current Energy Agreement set in place in 2012 includes a target of applying another 1900 MW of new capacity from onshore and offshore wind by the end of 2021. Most of the new capacity will come from offshore wind power. In this respect the Danish Energy Agency was responsible for tendering 1350 MW new offshore capacity: The Horns Rev 3 tender of 400 MW in the North Sea with expected commissioning in 2018, the Kriegers Flak tender of 600 MW in the Baltic Sea with expected commissioning in the period 2019-21 and the so-called near shore tender of 350 MW – Vesterhav Nord and Syd - with expected commissioning in 2020. Also part of the 2012 Energy Agreement, Denmark was responsible for tendering 50 MW offshore test projects – Nissum Bredning test project (28MW) was signed with expected commissioning in 2017. As a result, wind energy is expected to cover 50 % of Danish electricity consumption in 2020.	2013	Government:Danish Energy Agency and entities responsible for energy production	IE (G1 and G3)	IE (G1 and G3)	
EN-5(expired): Scrapping scheme for old wind turbines	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	The scrapping scheme has supported the taking down of old and unfavourable placed wind turbines and has supported the expansion of wind power.	2008	Government:Danish Energy Agency	IE (G1 and G3)	IE (G1 and G3)	
EN-6: Energy development and demonstration	Yes*	Energy	CO2, CH4, N2O	Research and development (), Research and development (), Research and development ()	Information	Implemented	Danish support for new energy technologies has been comprehensive and relatively stable. A long list of direct and indirect support schemes and policies have, in combination, created a domestic market which has given Danish companies a boost. This boost has enabled many companies to become international market leaders. Danish companies continue to enjoy commercial success within the energy-related marketplace. R&D activities include energy savings, more efficient energy conversion, renewable energy technologies and efforts within System Integration and Smart Energy. Research and development activities in the field of energy are not motivated solely by climate issues, but are relevant to climate issues, since they contribute to determining the overall framework for the CO2 intensity of energy production and consumption in the future. There is a broad political commitment to support R&D activities through public funding and the Danish Government has in its manifesto by November 2016 stated that Denmark is committed to an ambitious green transition for the national energy supply. This calls for comprehensive R&D efforts for the development of improved and new sustainable energy technologies. Denmark is one of the partners in the public-private initiative Mission Innovation comprising 22 countries and the European Commission. The aim of Mission Innovation, that was founded in relation to the COP21 in Paris 2015, is to strengthen the multilateral R&D efforts within clean energy technologies to promote a continuous cost effective green transition of the energy systems. Thus Denmark as one of the partners has chosen to strengthen the dedicated public investments in clean energy research, development and demonstration focusing on reduction of technology costs and CO2 emissions and with an emphasis on innovative projects that can be replicated and scaled up with the involvement of private investors. Denmark will seek to double these efforts departing from a baseline of the average funding to the Danish Energy Technology Development and Demonstration Programme (EUDP) of the years 2015-2016 and until 2020 where DKK 580 million will be allocated. The EUDP programme was established in 2008 and since then the programme has supported more than 600 projects with a total of DDK 3 billion. On average, 45-50% of the activities under the Programme are financed by the EUDP and hence the private investments in the supported projects are of the same size as the public support leading to approximately to DKK 6 billion in total investments. The Danish Parliament has dedicated DKK 400 mio. for EUDP for the fiscal year 2018. A minor programme is administrated on behalf of the power distribution companies by the Danish power association Dansk Energi. The objective is to support research and development within energy-efficient use of electricity through development of energy-efficient products and processes in buildings, industry etc. The annual funds for this programme are DKK 25 million. Activities relating to strategic research and innovation in general are since 2014 administrated by Danish Innovation Fond. The Fund covers all sorts of research and innovation projects and is not limited to energy matters. However, for 2017 and 2018 DKK at least 100 mio. /year will be earmarked for R&D within new and clean energy technologies.	2008	Government:EUDP Secretariat c/o Danish Energy Agency	IE (G1)	IE (G1)	

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects													
Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact		Source of estimates
										2020	2030	
BU-1: Agreements on energy efficiency with business	Yes*	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Voluntary Agreement, Economic	Implemented	In connection with the implementation of the CO2 tax also a subsidy for CO2 tax discount for energy intensive industries was introduced. However, a condition for getting the CO2 tax discount is an agreement on improvements in energy efficiency between the company and the Danish Energy Agency. The first implementation period was 1993-2013. After one year expiration the voluntary agreement scheme was reintroduced in 2015. The electricity intensive companies get a subsidy for their PSO tax on electricity.	1993	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
BU-2: Savings activities by elec. grid, gas, oil and district heating companies (consump. of final energy excl. Transp.)	Yes*	Energy	CO2	Demand management/reduction (Energy consumption)	Information	Implemented	The energy companies carry out campaigns and energy saving activities aimed at energy consumers. And the energy companies are obliged to realise savings in final consumption. In their efforts there are no geographical or sector limitations. The target for the savings is 10.1 PJ for the period 2016-2020. The effort is financed by the consumers via the consumers' energy bills.	2006	Government:Danish Energy Agency	60 and IE (G1 and G4)	60 and IE (G1 and G4)	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
BU-6: Circular on energy-efficiency in state institutions	Yes*	Energy	CO2	Efficiency improvement in services/ tertiary sector (Energy consumption)	Regulatory	Implemented	"The circular require state institutions to: □ Focus on energy efficiency in their behaviour □ Buy energy efficient products □ Operate state buildings in an energy efficient manner □ Report on, and make public, figures on consumption of energy and water and energy labelling of buildings"	2005	Government:The Danish Energy Agency is responsible for the circular. The individual ministries and state institutions are responsible for the implementation of the circular.	IE (G1 and G4)	IE (G1 and G4)	
BU-7(expired): Campaigns and promotion of efficient appliances (including elec. heating, conversion and efficient appliances in households)	Yes*	Energy	CO2	Efficiency improvement of appliances (Energy consumption)	Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	The task of the Electricity Saving Trust included the promotion of efficient electric appliances etc. and electric heating conversion in households and the public sector. The Trust were making use of measures such as national campaigns, efforts to influence the market, voluntary agreements and efforts to raise awareness on the consumption. The budget was approx. DKK 90-100 mill. annually.	1997	Government:The Minister for Climate and Energy / The Danish Energy Authority	IE (G1 and G4)	IE (G1 and G4)	
BU-8(expired): Renewables for the industry	Yes*	Energy	CO2	Increase in renewable energy (Energy supply)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	Businesses will be able to get support from a DKK 3.75 billion fund to convert to renewable energy sources or district heating in accordance with the following objectives: • Support businesses to replace fossil fuels with renewable energy – such as wind, solar, biogas or biomass – to power manufacturing, • Support businesses to replace fossil fuels by district heating. E.g. horticulture will be able to change from coal-fired boilers to district heating, • Support businesses to invest in energy-efficiency measures. The estimated effect of this "Renewables for industry" initiative is a reduction of 1 million tonnes of CO2 per year from 2020 and onwards.	2013	Government:Danish Energy Agency, other state authorities, enterprises	1000	IE (G1)	The estimate for 2020 shown here is a former separate estimate for this measure. Although this measure has expired it is still included in the list as some effect of the implementation carried out before expiration remain. But this has not been quantified separately. The separate estimate shown here is not included in the calculation of the total effect of all measures.
BU-9: Mandatory Energy Audit for large Enterprises	Yes*	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory	Implemented	Large enterprises in Denmark are by law required to have a mandatory energy audit every fourth year . The law transposes the energy efficiency directive article 8 . Enterprises with ISO 50,001 or ISO 14,001 are exempt. The Energy Audit must be carried out before the 5th of December 2015 and afterwards every fourth year. The scope of the energy audit is buildings, processes and transport. There are no requirement of the use and implementation of the results from the energy audit.	2014	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
BU-10: The center for energy savings in enterprises	Yes*	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Information	Implemented	The Center for Energy savings in enterprises As part of a new political agreement from June 2014 on growth 40 million DKK (5.4 million EURO) was allocated to run a new centre for energy savings in enterprises. The money was given for the period 2014-2017. The aim of the centre is to identify and exploit the energy efficiency potential already existing within primarily small and medium sized companies.	2014	Government:Danish Eneergy Agency	IE (G1 and G4)	IE (G1 and G4)	

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact 2020	Estimate of mitigation impact 2030	Source of estimates
TR-1a: EU demands on vehicle manufactures to deliver fuel efficient cars and vans	Yes*	Transport	CO2	Efficiency improvements of vehicles (Transport)	Regulatory	Implemented	The EU's requirements on average CO2 emissions for passenger cars and vans, i.e. the mechanism imposing fines on manufacturers if they fail to comply with the CO2 targets.	2000	Other:European Commission	600 and IE (G1, G4 and G5)	600 and IE (G1, G4 and G5)	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
TR-1b(expired): Information campaign on fuel consumption of new cars	Yes*	Transport	CO2	Demand management/reduction (Transport), Improved behaviour (Transport)	Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	DKK 14 million was allocated for a campaign aimed at raising public awareness about energy labelling of new cars and vans.	2000	Government:Denmark`s Road Safety and Transport Agency	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TR-2(expired): Energy-correct driving technique	Yes*	Transport	CO2	Improved behaviour (Transport)	Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	DKK 28 million was allocated to campaigns to promote energy-efficient driving. Experience shows that most people are able to save between 5% and 15% fuel by adopting a more energy-efficient driving style.	2000	Government:Ministry of Justice	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TR-3(expired): Initiative on enforcing speed limits	Yes*	Transport	CO2	Improved behaviour (Transport)	Information, Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	As of February 1, 2015 the number of mobile speed enforcement devices (mobile cameras) was increased from 25 to 100 nationwide. The effect on GHG emissions is uncertain, but it has previously been estimated that increased enforcement of speed limits could result in a reduction of approximately 55.000 tonnes CO2 annually.	2014	Government:Ministry of Justice	IE (G1, G4 and G5)	IE (G1, G4 and G5)	
TR-4(expired): Establishment of intermodal installations	Yes*	Transport	CO2	Modal shift to public transport or non-motorized transport (Transport), Improved behaviour (Transport)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	Promotion of the establishment of intermodal installations has been a general transport policy for many years. In 2009, as a result of a broad political agreement regarding transport policy in Denmark, funds were allocated to several activities in the transport sector. This includes: • DKK 200 million for projects on energy-efficient transport, where the following project has focus on the promotion of the establishment of intermodal installations: o Rail-truck container transfer systems to promote multi-modal transport	2014	Government:Ministry of Transport and Energy, municipalities, Danish State Railways (DSB)	IE (G1 and G4)	IE (G1 and G4)	
TR-5(expired): Promotion of environmentally friendly goods transport	Yes*	Transport	CO2	Modal shift to public transport or non-motorized transport (Transport), Demand management/reduction (Transport), Improved behaviour (Transport)	Economic, Information	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	Promotion of environmentally friendly goods transport has been a general transport policy for many years. In 2009, as a result of a broad political agreement regarding transport policy in Denmark, funds were allocated to several activities in the transport sector. This includes: • DKK 200 million for projects on energy-efficient transport, where the following projects have focus on promotion of environmentally friendly goods transport - solely or partly: o Off-peak delivery scheme for goods using low-noise equipment o City logistics for goods transport o Lightweight materials for pressurized equipment, containers etc. o Mobility Management o Intelligent Transport Systems	2014	Government:Danish Environmental Protection Agency, Haulage contractors	IE (G1 and G4)	IE (G1 and G4)	
TR-6(expired): Reduced travel times for public transport	Yes*	Transport	CO2	Modal shift to public transport or non-motorized transport (Transport), Demand management/reduction (Transport)	Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	In 2013, the Danish government decided to allocate DKK 27.5 billion to improve the rail infrastructure in Denmark substantially. The upgrade is expected to be finalized by 2025 and will reduce travel times substantially. A CO2 reduction of around 100,000 tonnes per year is expected.	2014	Government:Ministry of Transport and Energy and Danish State Railways (DSB)	IE (G1 and G4)	IE (G1 and G4)	
TR-7: Spatial planning	Yes*	Transport	CO2	Low carbon fuels/electric cars (Transport), Demand management/reduction (Transport), Improved transport infrastructure (Transport)	Regulatory	Implemented	Spatial planning on state, regional and local level is also taking into account the objective to limit the growth in demand for passenger and freight transport and thereby reduce the number of vehicle kilometres driven and GHGs emitted. For example, spatial planning, in terms of urbanization and increased focus on minimising distances between residential areas/city centres and stations, help to reduce the need for transport.	2000	Local:Municipalities	IE (G1 and G4)	IE (G1 and G4)	
TR-8: EU requirements regarding biofuels	Yes*	Transport	CO2	Low carbon fuels/electric cars (Transport)	Regulatory	Implemented	From 2012 all petrol and diesel for transport sold in Denmark must contain an average of 5.75% of biofuels, which must live up to the EU sustainability criteria. According to the Energy Agreement of March 2012 a 10 per cent target is foreseen by 2020, however this will depend on further analysis of alternative instruments carried out by 2017. This will probably lead to a lower blending mandate.	2012	Government:Danish Energy Agency	290 and IE (G1 and G3)	290 and IE (G1 and G3)	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
TR-9(expired): Transport infrastructure projects in the fields of electric vehicles, gas and hydrogen	Yes*	Transport	CO2	Low carbon fuels/electric cars (Transport), Improved transport infrastructure (Transport)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	In the agreement DKK 70 million has been allocated to transport infrastructure projects in the fields of electric vehicles, gas and hydrogen. An ongoing pilot scheme for electric vehicles has been prolonged until 2015 with an additional funding of DKK 15 million on top of the DKK 35 million from the former Energy Agreement.	2014	Government:Ministry of Transport	IE (G1)	IE (G1)	
TR-10: Electrification of parts of the rail infrastructure	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Adopted	In 2013, the former government decided to allocate the future proceeds from a change in the oil industry taxation to improve the rail infrastructure in Denmark. The upgrade is expected to reduce travel times substantially. In 2017 changed to been seen as also including the measure formerly reported as TR-6.	2014	Government:Ministry of Transport	IE (G1)	IE (G1)	
TR-11(expired): Investments in a new metro line and bicycle transport facilities.	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	DKK 328 million to the establishment of a metro line to the new Nordhavn area in Copenhagen – and DKK 1 billion to improve and promote Danish cycle transport facilities.	2014	Government:Ministry of Transport, Local:Municipality of Copenhagen	IE (G1)	IE (G1)	
TR-12: Investment in a tunnel under the Femern Belt	Yes*	Transport	CO2	Improved transport infrastructure (Transport)	Economic	Adopted	The tunnel under the Femern Belt will reduce CO2-emissions by potentially 200.000 tonnes per year. This is mainly because of the following effects: 1.Goods will shift from road to rail. 2. The travel distance from Copenhagen to Hamburg will be shortened. 3.The ferries between Denmark and Germany will cease to operate.	2028	Government:Ministry of Transport	**-300**	**200**	Estimates for the construction phase (emissions of 300 kt CO2eq/year) and operation phase (reduktion of 198.5 kt CO2eq/year) in the 2013 EIA for the project, Chapter 19 (https://www.trm.dk/da/publikationer/2013/vvm-for-femern-baelt).

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact 2020	Estimate of mitigation impact 2030	Source of estimates
HO-1: Energy labelling of small and large buildings (incl. public sector and business)	Yes*	Energy	CO2, CH4, N2O	Efficiency improvements of buildings (Energy consumption)	Regulatory, Information	Implemented	Energy labelling of buildings: Denmark has long experience with energy efficiency and energy savings in buildings. From 1990 and until 2015 the energy consumption for heating has been reduced by 17,5% per m2. The goal is to reduce energy consumption in new buildings by 75% by 2020 relative to 2006. The benefits of reducing energy consumption are tangible: less fossil fuel is consumed and the environment has improved substantially. Strict and progressively tightened building regulations since 1977 have ensured a stable demand for energy-efficient building technologies. Energy labelling of buildings when built, sold or rented: Energy labelling of buildings must be implemented after finishing the construction of a building and on the sale or rental of the building - primarily heating consumption. This applies in principle for all buildings, irrespective of size, apart from production facilities, factories etc. Regular energy labelling of large buildings and public buildings: Energy labels and an energy plan must be prepared regularly every seven to ten years for all large buildings over 1,000 m2 and for all public buildings over 250 m2.	1997	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-2: Energy labelling of electric appliances	Yes*	Energy	CO2	Efficiency improvement of appliances (Energy consumption)	Information	Implemented	Minimum energy requirements and energy labelling of appliances: Energy labelling (A-G) of white goods, lighting, air con etc. is compulsory within the EU. The European Community also has mandatory energy requirements for some 20 energy-consuming products, such as electric motors, circulators, white goods etc. There are also voluntary labelling schemes (Energy Star, Energy Arrow, windows, boilers) for a number of products. Danish authorities play an active role both in negotiation of the requirements and in securing compliance with the compulsory requirements - e.g. through market surveillance. The Danish Energy Agency offers advice on its website to end-users in order to promote energy-efficient appliances and products. Information initiative towards private households: In March 2012 the Centre for Energy Savings was replaced by an information initiative placed at the Energy Agency. The main target of this initiative is to promote energy-efficient products and solutions. The measures of the initiative will be information campaigns, web-based information for private households etc.	1992	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-3: Substitution of individual oil-based furnaces	Yes*	Energy	CO2	Switch to less carbon-intensive fuels (Energy supply), Efficiency improvements of buildings (Energy consumption)	Economic, Information	Implemented	In 2010-2012 DKK 400 mill. have been allocated to support the substitution of individual oil based furnaces for modern, low emitting heating solutions, including systems based on renewable energy such as heat pumps and solar heating. As of September 2013 the measure has been continued as an information effort without subsidies.	2010	Government:Danish Energy Agency	20 and IE (G1 and G4)	20 and IE (G1 and G4)	Estimates in 2017 - based on The 2013 Analysis of the Effects of Selected Measures for the National Audit Office, Danish Energy Agency, December 2013 (http://www.ens.dk/sites/ens.dk/files/energistyrelsen/Nyheder/kyoto-samlenotat_9._december.pdf (an English translation is included in Annex B3))
HO-4: Better Houses	Yes*	Energy	CO2	Efficiency improvements of buildings (Energy consumption)	Information	Implemented	"BetterHouses" is a scheme (voluntary and market-driven system) from the Danish Energy Agency focusing on energy renovation of buildings. The aim is to make it easier for owners of buildings, mostly homeowners, to energy renovate by creating a "one stop shop" for energy renovation, where the owner only has to contact one certified building contractor and to get an overall counselling on energy renovation of the entire building. Skilled workmen are educated under the BetterHouses program to be advisors on energy renovation. The Danish Energy agency approves the BetterHouses firms and professionals like architects, engineers, craftsmen, energy consultants and building designers can take training courses to become BetterHouses advisors. The training is carried out at academies of higher education. A Better Houses advisor can manage the process and can follow the project all the way from plan to completed renovation.	2014	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-5: Strategy for Energy renovation of buildings	Yes*	Energy	CO2	Efficiency improvements of buildings (Energy consumption)	Information, Education, Research	Implemented	Strategy for energy renovation of buildings: The former Government adopted in May 2014 a strategy for energy renovation of buildings. The strategy contains initiatives which will promote the renovation of the Danish building stocks and insures that energy efficiency measures are implemented on the buildings. It is expected, that the effect of the strategy on energy consumption will be a reduction of net energy consumption for heating and hot water with 35 pct. in 2050 compared with 2014. The strategy includes following initiatives: • Revision and upgrade of building regulations and energy requirements that applies to renovation and retrofitting of existing buildings • Information to building owners, construction companies, financial institutions etc. on energy how to improve energy efficiency • Revision of the energy certificates scheme to improve the efficiency of the scheme • Promotion of the ESCO-concept (ESCO: Energy Service Companies) • Promotion of energy efficiency in public buildings • Measures to improve professional training to craftsmen and engineers in the building sector • Development and demonstration of new technologies.	2014	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
HO-6 (new): Heat pumps as an energy service	Yes*	Energy	CO2	Efficiency improvements of buildings (Energy consumption), Increase in renewable energy (Energy supply)	Economic	Implemented	The purpose of the initiative is to facilitate a market for energy services based on heat pumps where energy companies install, finance, run and maintain heat pumps installed in mainly single family houses. In return the customer pays for the heat delivered by the heat pump. Thereby heat pumps as an energy service imitates the way that district heating has been deployed and driven in urban areas. The initiative is targeting mainly rural areas where demographic and economic conditions means that people are reluctant to invest in the transition of their fossil based heating to heating based on renewable energy.	2016	Government:Danish Energy Agency	IE (G1 and G4)	IE (G1 and G4)	
IP-1: Regulation of use of HFCs, PFCs and SF6 (phasing out most of the uses)	Yes*	Industry/Industrial processes	HFCs, PFCs, SF6	Reduction of emissions of fluorinated gases (Industrial processes)	Regulatory	Implemented	Import, sale and use of the substances or new products containing the substances is forbidden from 1 January 2006 with some exceptions.	2006	Government:Danish Environmental Protection Agency	IE (G1 and G6)	IE (G1 and G6)	

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact		Source of estimates
										2020	2030	
AG-1(expired): Action Plan for the Aquatic Environment I+II and Action Plan for Sustainable Agriculture	Yes*	Agriculture	N_2O	Reduction of fertilizer/manure use on cropland (Agriculture)	Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	The action plans contain several measures e.g. with the objective to increase the area with winter green fields and better utilisation of manure.	1987	Government:State, Local:Municipalities	**1900**	**1900**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
AG-2(expired): Action Plan for the Aquatic Environment III	Yes*	Agriculture	N_2O	Reduction of fertilizer/manure use on cropland (Agriculture)	Economic, Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	The plan contain several measures, where the most import in relation to greenhouse gas emissions are: □ Establishment of 4000 ha wetlands in 2004 and 2005. □ Making the rules on catch crops more rigorous. □ Making the rules on exploitation of N in animal manure more rigorous. □ Additional environmentally friendly measures in crop farming.	2004	Government:State, Local:Municipalities	IE (G1)	IE (G1)	
AG-4a/4b/4c/4d/4e: Reduced emissions of ammonia	Yes*	Agriculture	N_2O	Reduction of fertilizer/manure use on cropland (Agriculture), Improved animal waste management systems (Agriculture)	Regulatory	Implemented	1) Optimisation of manure handling in sheds for cattle, pigs, poultry and fur animals. 2) Rules on covering storage facilities for solid manure and slurry tanks. 3) Ban on overall surface spreading and reduction of the time from field application of manure to incorporation. 4) Ban on ammonia treatment of straw.	2001	Government:State, Local:Municipalities	IE (G1)	IE (G1)	
AG-4f: Environmental Approval Act for Livestock Holdings	Yes*	Agriculture	N_2O, CH_4	Reduction of fertilizer/manure use on cropland (Agriculture), Improved livestock management (Agriculture), Improved animal waste management systems (Agriculture)	Regulatory	Implemented	The measures covered by the Environmental Approval Act for Livestock Holdings are: • 300 m buffer zones around ammonia sensistive areas where no extension of livestock farms can take place if such an extension would lead to increased ammonia deposition in natural areas vulnerable to ammonia. • Demand for reduction of ammonia emissions relative to production facility with lowest ammonia emission norm: 2007: 15%, 2008: 20%, 2009: 25% • Demands for injection of animal slurry on black soil and grass within buffer zones (1 km from vulnerable natural areas). • Demand for fixed cover on most new containers for solid manure and slurry tanks (depending on distance to neighbours and vulnerable natural areas). • Reduced number of Livestock Unit per hectare (LU/ha) when in nitrate vulnerable areas with low denitrification capacity • Regulation of phosphorous surplus on manure spreading areas	2007	Government:State, Local:Municipalities	IE (G1)	IE (G1)	
AG-6: Biogas plants	Yes*	Agriculture, Energy	CO_2, CH_4	Improved animal waste management systems (Agriculture), Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	The Energy Policy Agreement continued funding biogas for CHP and introduced subsidy equality so that biogas sold to the natural gas grid receives the same subsidy as biogas used at CHP plants. In addition the agreement also introduced a new subsidy when biogas is used in industrial processes or as a fuel for transport. Implementation of the latter awaits approval by the European Commission under the EU state aid legislation.	1987	Government:State	**240**	**207**	2020: "Biogasproduktions konsekvenser for drivhusgasudledning i landbruget" Rapport nr. 197 DCE, 2016 (http://dce.au.dk/udgivelser/vr/nr-151-200/abstracts/nr-197-biogasproduktions-konsekvenser-for-drivhusgasudledning-i-landbruget/); 2030: Preliminary estimate (to be published, in Danish).
AG-9(expired): Agreement on Green Growth	Yes*	Agriculture, Energy	N_2O, CO_2, CH_4	Reduction of fertilizer/manure use on cropland (Agriculture), Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic, Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	The Green Growth Agreement contains targets with respect to discharges of nitrogen and phosphorus to the aquatic environment, protection of nature and biodiversity, development of renewable energy in the agricultural sector including biogas plant, reduction of harmful pesticides, development of the organic sector and strengthened initiatives within R&D within the agricultural and food sectors.	2009	Government:State	0	0	The estimate for 2020 shown here is a former separate estimate for this measure. As this measure has been replaced by measure no. AG-12, only the effect estimated under AG-12 is included in the calculation of the total effect of all measures.
AG-11(new+expired): Agreement on Green Growth 2.0	Yes*	Agriculture, Energy	CO_2, CH_4, N_2O	Increase in renewable energy (Energy supply), Reduction of pesticides use (), Reduction of tax on productive farmland (), Conversion to organic farming ()	Economic, Regulatory	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	The agreement contains a series of initiatives to improve agriculture and food sector growth conditions and thus help to secure employment on farms, in the food industry and downstream industries. The initiatives also contribute to support Denmark's target of 30 per cent renewable energy by 2020 and fulfilment of Denmark's climate goals through further development of bioenergy.	2010	Government:Ministry of Environment and Food	0	0	Notat nr. 2, Vedrørende effekter af forskellige tiltag i forbindelse med Grøn Vækst, Aarhus Universitet (http://pure.au.dk/portal/files/38211855/010511_DJF_DMU_notat_2_inkl_Baselinegruppens_kommentarer_og_sp_rgsm_l.pdf , in Danish)
AG-12(new): Political Agreement on a Food and Agricultural Package	Yes*	Agriculture	N_2O, CO_2	Improve the ability of the food and agricultural industry to increase primary production and exports, as well as to contribute to creating growth and jobs, in due interaction with protection of nature and the environment. ()	Economic, Regulatory	Implemented	The agreement includes a diverse package of measures to make a shift in the way environmental regulation of the agricultural sector is carried out, from a general regulation to a targeted approach, and within five focus areas: Sustainable basis (The activity includes RDP measures for new environmental technology in farming, organic farming, nature protection and efforts to reduce nitrates leaching to the water environment, including set aside of low-lying farmland with climate focus or subsidy for conversion of arable land on organic soils to nature)/ Increased commodity basis/ Strengthened competitiveness/Development of future food production/ Visionary export efforts. Net neutral effect on total greenhouse gas emissions is expected when including the effect in the LULUCF sector.	2016	Government:Ministry of Environment and Food	**-122**	**-122**	Answer to question no. 391 (ord. part) asked by the parliament's Committee for Environment and Food on 15 Januar 2016 (http://www.ft.dk/samling/20151/almdel/mof/spm/391/svar/1299227/1598927/index.htm , in Danish)
AG-13(new): Agreement on Nature (the Nature Package)	Yes*	Agriculture, Forestry/LULUCF	CO_2, CH_4, N_2O	Protection of biodiversity through increased involvement of farmers in land use planning, simplification of related legislation etc. (), Protection of biodiversity through increased involvement of farmers in land use planning, simplification of related legislation etc. ()	Regulatory	Implemented	Political agreement aiming, amongst other goals, towards an increased protection of biodiversity. The agreement states initiatives within the following areas: Converting forests for biodiversity purpose, continued agreements for nature, nature and biodiversity, urban nature and outdoors recreation, open land management and the farmer's role as resource manager, modern nature conservation, and simplification of legislation.	2016	Government:Ministry of Environment and Food	IE (G1)	IE (G1)	
LU-1: Ban on burning straw on fields	Yes*	Forestry/LULUCF	CO_2	Conservation of carbon in agricultural soils and reduction of air pollution. ()	Economic	Implemented	One of the measures with an effect on return of carbon to the soil has been the ban on burning of straw residues on fields. The ban has resulted in greater return of carbon to the soil, and therefore increased carbon storage in the soil, as well as increased use of straw as a fuel. Both uses will result in a net reduction in CO_2 emissions. Not burning straw prevents the methane and nitrous oxide emissions associated with the burning. On the other hand, there are some emissions of nitrous oxide in connection with the return of nitrogen to the soil when the straw is mulched. The measure works by regulating behaviour, and the ban was introduced from 1990. The measure was implemented in the form of a statutory order under the Environmental Protection Act, and compliance is monitored by the local authorities. The objectives are conservation of carbon in agricultural soils and reduction of air pollution.	1989	Government:State, Local:Municipalities	IE (G7)	IE (G7)	
LU-2: Planting of windbreaks	Yes*	Forestry/LULUCF	CO_2	Enhancing carbon sequestration through planting of windbreaks ()	Economic	Implemented	Planting of windbreaks is another measure which will increase sequestration in woody biomass. The objective of planting windbreaks has been primarily to reduce wind erosion and ensure greater biodiversity. Planting of windbreaks has been supported under conditions described in the Statutory Order on Subsidies for Planting Windbreaks and Biotope-improving Measures (Statutory Order no. 1101 of 12/12/2002). Support has been granted under the EU Rural Districts Programme. For the period 2017-2019 windbreaks will be supported under the political agreement "Naturpakken" and will focus primarily on ensuring greater biodiversity. Since the end of the 1960s about 1,000 km of tree-lined windbreaks have been planted with government subsidies. It is also estimated that about 30% more has been planted without subsidies. Estimates indicate that planting of windbreaks leads to CO_2 sequestration in woody biomass of about 130,000 tonnes CO_2/year.	1960	Government:Ministry of Environment and Food	IE (G7)	IE (G7)	
LU-3: Subsidies scheme for private afforestation on agricultural land (increase the forest area in Denmark)	Yes*	Forestry/LULUCF	CO_2	Afforestation and reforestation (LULUCF), Strengthening protection against natural disturbances (LULUCF)	Economic	Implemented	Private owners of agricultural land can get grants for establishment of broadleaves or conifer forests, nursing of these in the first 3 years, establishment of fences, mapping and or accounting of the area - if the forest will be established in an area planned for afforestation.	1991	Government:Danish Environmental Protection Agency	IE (G7)	IE (G7)	
LU-4: Public afforestation (state and municipalities)	Yes*	Forestry/LULUCF	CO_2	Afforestation and reforestation (LULUCF), Strengthening protection against natural disturbances (LULUCF)	Regulatory, Voluntary Agreement	Implemented	State forests are established with resilient tree-species as a collaboration between state, municipalities and (often) waterworks. On-going implementation through annual budgets.	1989	Government:Danish Environmental Protection Agency, Local:Municipalities	IE (G7)	IE (G7)	
LU-5: Subsidy for conversion of arable land on organic soils to nature	Yes*	Forestry/LULUCF, Agriculture	CO_2, N_2O	Reduction of fertilizer/manure use on cropland (Agriculture), Prevention of drainage or rewetting of wetlands (LULUCF)	Economic	Implemented	Payment of farmers to revert soils with high organic contents. From 2014 to 2017 is planned to give economic subsides to convert 2500 hectares of organic lowland areas into rewetted natural habitats and reduce emissions of greenhouse gases. The organic soils will be registered with no tillage, no fertilisation and no pesticide application. On-going implementation. The initiative is extended to 2020.	2015	Government:Ministry of Environment and Food	IE (G7)	IE (G7)	

Table 3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects												
Name of mitigation action	Included in with measures GHG	Sector(s) affected	GHG(s) affected	Objective and/or activity affected	Type of instrument	Status of implementation	Brief description	Start year of imple-	Implementing entity or entities	Estimate of mitigation impact 2020	2030	Source of estimates
WA-1: A ban of landfill of combustible waste.	Yes*	Waste management/waste	CH4	Reduced landfilling (Waste), Waste incineration with energy use (Waste), Enhanced recycling (Waste)	Regulatory	Implemented	In 1996 the Statutory Order on Waste was amended to introduce an obligation for municipalities to assign combustible waste to incineration (corresponding to a stop for disposal of combustible waste at landfills) from 1 January 1997. As a result of this, large quantities of combustible waste that used to be disposed of at landfills are now either recycled or used as fuel in Danish incineration plants.	1997	Local:Municipalities	**333**	**333**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
WA-2: The waste tax	Yes*	Waste management/waste	CH4	Reduced landfilling (Waste)	Economic, Fiscal	Implemented	A tax is imposed on waste for incineration or landfilling. The taxes are DKK 475 per tonne for landfilling and DKK 60,9/GJ for incineration	1987	Government:Ministry of Taxation	IE (G1)	IE (G1)	
WA-3: Weight-and-volume-based packaging taxes	Yes*	Waste management/waste	CO2, CH4	Demand management / reduction (Waste)	Economic, Fiscal	Implemented	Weight-and-volume-based taxes (e.g. on various packaging, carrier bags and PVC film) encourage a reduction in packaging consumption and thus the quantities of waste. The weight-based tax is based on an index that reflects the environmental burden of the materials used.	2014	Government:Ministry of Taxation	IE (G1)	IE (G1)	
WA-4: Subsidy programme – Enterprise Scheme (special scheme for businesses)	Yes*	Waste management/waste	CH4	Demand management / reduction (Waste)	Economic	Implemented	In 2005 the Programme for Cleaner Products etc. was replaced by the Danish government's "Enterprise Scheme" which refunds CO2 taxes to business. The waste part of this programme was aimed exclusively at enterprises. A total of DKK 33 million for the five-year period 2004 to 2008 was earmarked for the waste part of the scheme. The subsidies were to be used to reduce the environmental impact of waste. Two projects with reduction of methane emissions were supported: a. To address the obstacles and to improve the method, another biocover-project was initiated in 2007 as part of the Enterprise Scheme. The project was performed on another landfill (i.e. not the landfill in the biocover-pilotproject 2005-2006 carried out with support from Danish EPA and the EU LIFE programme), and was taking the identified difficulties into account. A reduction of the methane emission of 79-93 % was reported in the project. b. In 2007 subsidies from the enterprise scheme were also given for establishing methane recovery and test pumping at 11 landfill sites. The results were reported in 2011 and showed a reduction of the emission of methane over a five year period equalling 84,435 tonnes of CO2 equivalents. In 2015 no money is assigned to the Entreprise Scheme, and it is expected, that this will also be the case in 2016.	2004	Government:Ministry for the Environment	IE (G1)	IE (G1)	
WA-5: Increased recycling of waste plastic packaging	Yes*	Waste management/waste	CO2	Enhanced recycling (Waste)	Regulatory	Implemented	The goal in the EU Packaging Directive of increasing the collection of plastic packaging waste for recycling to 22.5% was met in 2008 through an amendment to the Statutory Order on Waste requiring municipalities to improve the possibilities of people and enterprises to separate and deliver plastic packaging waste for recycling. This meant an increase in recycling of about 12,000 tonnes in 2012 compared to 2008.	1994	Government:Danish Environmental Protection Agency	IE (G1)	IE (G1)	
WA-6: Implementation of the EU landfill directive	Yes*	Waste management/waste	CH4	Improved landfill management (Waste)	Regulatory	Implemented	On the basis of the EU Landfill Directive, demands on the establishment and operation of landfills in Denmark have been tightened with Statutory Orders No. 650 of 29 June 2001, No. 252 of 31 March 2009, No. 719 of 24 June 2011 and No. 1049 of 28th of August 2013 on landfills. According to the Statutory Orders on landfills, methane in landfills for mixed waste must be monitored. From landfills where significant amounts of biodegradable waste are disposed of, methane gas must be managed in an environmentally-sound way.	1999	Government:Danish Environmental Protection Agency, Local:Municipalities	IE (G1)	IE (G1)	
WA-7(expired): Support for (construction of facilities for) gas recovery at landfill sites	Yes*	Waste management/waste	CO2, CH4	Enhanced CH4 collection and use (Waste)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	Methane is recovered at landfills. The methane collected acts as fuel in CHP production. Waste, measures no longer in place, but replaced with the general price supplement (EN-3).	1984	Government:Danish Energy Authority	**205**	**205**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
WA-8(expired): Subsidy programme for cleaner products	Yes*	Waste management/waste	CH4	Demand management / reduction (Waste)	Economic	Implemented (and Expired - but included as it is expected to have influenced the level of total Danish greenhouse gas emissions)	Under the subsidy programme for cleaner products 1999-2003 it was possible to get grants for projects targetted at reducing the environmental impact from management of waste generated throughout the life cycle of products as well as for projects with the objective to limit environmental problems in connection with waste management. In 2005 this programme was replaced by the Danish government's "Enterprise Scheme" (see WA-4).	1999	Government:Ministry for the Environment	IE (G1)	IE (G1)	
WA-9: Subsidy programme for biocovers on landfills	Yes*	Waste management/waste	CH4	Improved landfill management (Waste)	Economic	Implemented	Biocovers is a technique that uses compost as a cover on landfills. The microorganisms in the compost increases the oxidation of methane in the top layer.	2017	Government:Danish Environmetal Protection Agency	**300**	**179**	Estimates by the Danish Energy Agency, March 2017 - based on "Virkemiddelkatalog, Tværministeriel arbejdsgruppe, August 2013, Klima-, Energi- og Bygningsministeriet" (https://ens.dk/sites/ens.dk/files/Analyser/virkemiddelkatalog_-_potentialer_og_omkostninger_for_klimatiltag.pdf)
G1(changed): Group of all policies and measures except in the LULUCF sector	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7, -8, -9; EN-1, -2, -3, -4, -5, -6; BU-1, -2, -6, -7, -8, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12; HO-1, -2, -3, -4, -5, -6; IP-1; AG-1, -2, -4a-f, -6, -9, -11, -12, -13; WA-1, -2, -3, -4, -5,- 6, -7, -8, -9)	Combined	Combined	Combined	Combined	Combined. Overlapping effects are avoided as far as possible - by adding only **G3**(CO2-effects from RE in Energy), **G4**(CO2-effects from EE in Energy), **TD-9** (CH4-effects from tax on methane), **TR-12** (CO2-effects of the Femern Belt Tunnel project), **G6** (Effects of F-gas taxes and regulation), **AG-1**(N2O-effects of the Action plans for the aquatic environment in Agriculture), **AG-6** (CH4/CO2-effects of the biogas measure in Agriculture), **AG-12** (Effects of new food and agricultural package), **WA-1** (CH4-effect of ban on landfilling of combustible waste), **WA-7** (CH4-effect of gas recovery) and **WA-9** (CH4-effect of biocovers).	Combined	Combined	**43135**	**46585**	Calculated as the sum of the effects estimated for G3, G4, TD-9, TR-12, G6, AG-1, AG-6, AG-12, WA-1, WA-7 and WA9.
G2(former TD-1a): Energy taxes except on mineral oil	Yes*	Combined (TD-2, TD-3 and TD-4)	Combined	Combined	Combined	Combined	Tax on energy use in Denmark. Denmark has had taxes on energy for many years . Since the first oil crisis in the early 1970s, the rates of the taxes have been aimed at reducing consumption and promoting the instigation of more energy-saving measures. Lower energy consumption will reduce emissions of CO2, methane (CH4), and nitrous oxide (N2O) associated with combustion of fossil fuels.	Combined	Combined	1000	1000	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
G3: All RE mitigation actions (Renewable Energy) since 1990	Yes*	Combined (EN-2, EN-3, EN-4, EN-5, BU-8 and TR-8)	Combined	Combined	Combined	Combined	The calculation of the annual total CO2 reducing effect of renewable energy mitigation actions follows the EU methodology for calculating this effect under the EU Renewable Energy Directive. For the period 1990-2014 the calculations are based on energy statistics. For the years 2020 and 2030 (= 2025 in practice) the calculations are based on the latest energy projection from December 2015.	Combined	Combined	**22805**	**24060**	Estimated in 2017 - sse Annex B4.
G4: All EE mitigation actions (Energy Efficiency) since 1990	Yes*	Combined (TD-b1, -2, -3, -4, -5, -6, -7; EN-1; BU-1, -2, -6, -7, -9, -10; TR-1a, -1b, -2, -3, -4, -5, -6, -7, -10, -11, -12; HO-1, -2, -3, -4, -5, -6)	Combined	Combined	Combined	Combined	The calculation of the annual total CO2 reducing effect of energy effciency mitigation actions follows the the empirically deduced assumption that the increase in Gross Energy Consumption - on average over several years - will follow the economic growth less 0.5 percentage point as 0.5 percentage point is assumed to be the avoided increase in energy consumption due to energy effciency actions in businesses and households not related to any mitigation action (i.e. due to economic optimisation or other incentives). For the period 1990-2014 the calculations are based on energy statistics. For the years 2020 and 2030 (= 2025 in practice) the calculations are based on the latest energy projection from December 2015. The calculations of CO2 reductions effects are based on annual CO2 intensity and therefore takes into account the increasing amount of renewable energy in energy supply in Denmark (e.g. if Denmark will have no use of fossil fuels in 2050, the effects of energy efficiency mitigation actions on CO2 emissions will be zero).	Combined	Combined	**16944**	**18793**	Estimated in 2017 - sse Annex B4.
G5(new): Energy effciency in transport by passenger cars	Yes*	Combined (TD-6, TR-1a, TR-1b, TR2 and TR-3)	Combined	Combined	Combined	Combined	Combined effects of measures with effect on the energy efficiency in transport by passenger cars	Combined	Combined	550	550	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
G6(new): F-gas taxes and regulation	Yes*	Combined (TD-8 and IP-1)	Combined	Combined	Combined	Combined	Combined effects of taxes from 2001 and regulations from 2006.	Combined	Combined	**800**	**800**	Estimates in 2017 - based on The 2005 Effort Analysis (http://www2.mst.dk/udgiv/publikationer/2005/87-7614-587-5/pdf/87-7614-588-3.pdf and http://www2.mst.dk/Udgiv/publikationer/2005/87-7614-589-1/pdf/87-7614-590-5.pdf (summary in English included in Annex B2)).
G7(new): LULUCF activities	No	Combined (LU-1, -2, -3, -4 and -5)	Combined	Combined	Combined	Combined	Combined effects of LULUCF-activities (expected credits based on a reference level and the base year period 2005-2009).	Combined	Combined	1740	1740	Estimates by DCE, 2017 (http://dce2.au.dk/pub/SR244.pdf).

* In principle included in the "with measures" projection scenario - not necessarily with separate annual estimates, but in most cases as a result of the assumption that the measure has contributed to the observed level of total Danish greenhouse gas emissions in the most recent historical inventory year used as the starting point for the projections.

** Estimated annual effects in 2020 and 2030 of measures implemented or adopted since 1990 - as also used in the "without measures" (WOM) scenario in Table 6(b), but only by adding not overlapping estimates.

TABLE 4: REPORTING ON PROGRESS

Table 4				
Reporting on progress [a, b]				
Year [c]	Total emissions excluding LULUCF (kt CO2 eq)	Contribution from LULUCF [d] (kt CO2 eq)	Quantity of units from market based mechanisms under the Convention (number of units and kt CO2 eq)	Quantity of units from other market based mechanisms (number of units and kt CO2 eq)
	*(a) total GHG emissions, excluding emissions and removals from the LULUCF sector; **	*(b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for;*	*(c) total GHG emissions, including emissions and removals from the LULUCF sector.*	
Base year/base period (specify) 1990	72,087.13	NA	NA	NA
2010	65,618.31	NA	NA	NA
2011	60,453.87	NA	NA	NA
2012	55,631.49	NA	NA	NA
2013	57,463.58	NA	NA	NA
2014	53,481.70	NA	NA	NA
2015	50,957.05	NA	NA	NA

Abbreviation: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For the base year, information reported on the emission reduction target shall include the following: (a) total GHG emissions, excluding emissions and removals from the LULUCF sector; (b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for; (c) total GHG emissions, including emissions and removals from the LULUCF sector. For each reported year, information reported on progress made towards the emission reduction targets shall include, in addition to the information noted in paragraphs 9(a–c) of the UNFCCC biennial reporting guidelines for developed country Parties, information on the use of units from market-based

[c] Parties may add additional rows for years other than those specified below.

[d] Information in this column should be consistent with the information reported in table 4(a)I or 4(a)II, as appropriate. The Parties for which all relevant information on the LULUCF contribution is reported in table 1 of this common tabular format can refer to table 1.

* To be seen as Denmark's contribution to progress towards the joint EU28 target for 2020. The estimates shown are therefore Denmark's (i.e. without Greenland and the Faroe Islands) total GHG emissions (without LULUCF and with indirect CO2 emissions) including CO2 from international aviation. On guidance from the European Commission the latter ("inventory CO2 from international aviation" based on fuel sold to aircrafts starting from Danish airports) is included in this table 4 as a proxy for CO2 from international aviation activities reported by aviation entities registered in the Danish quota register ("entity CO2 from international and domestic aviation" based on fuel used by Danish entities). The data without CO2 from international aviation is in kt CO2eq.: 70,356.39(1990)/63,217.47(2010)/57,982.07(2011)/53,138.01(2012)/54,992.85(2013)/50,800.99(2014)/48,331.14(2015).

TABLE 4(A)I: REPORTING ON PROGRESS - IN ACHIEVING THE QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS – FURTHER INFORMATION ON MITIGATION ACTIONS RELEVANT TO THE CONTRIBUTION OF THE LAND USE, LAND-USE CHANGE AND FORESTRY SECTOR IN 2014

Table 4(a)I

Progress in achieving the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the contribution of the land use, land-use change and forestry sector in 20XX-3 = 2017-3 = 2014 [a, b]

	Net GHG emissions/removals from LULUCF categories [c] (kt CO2 eq)	Base year/period or reference level value [d] (kt CO2 eq)	Contribution from LULUCF for reported year (kt CO2 eq)	Cumulative contribution from LULUCF [e] (kt CO2 eq)	Accounting approach [f]
Total LULUCF	NA*	NA*	NA*	NA*	NA*
A: Forest land	NA*	NA*	NA*	NA*	NA*
1. Forest land remaining forest land	NA*	NA*	NA*	NA*	NA*
2. Land converted to forest land	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
B. Cropland	NA*	NA*	NA*	NA*	NA*
1. Cropland remaining cropland	NA*	NA*	NA*	NA*	NA*
2. Land converted to cropland	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
C. Grassland	NA*	NA*	NA*	NA*	NA*
1. Grassland remaining grassland	NA*	NA*	NA*	NA*	NA*
2. Land converted to grassland	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
D. Wetlands	NA*	NA*	NA*	NA*	NA*
1. Wetlands remaining wetlands	NA*	NA*	NA*	NA*	NA*
2. Land converted to wetlands	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
E. Settlements	NA*	NA*	NA*	NA*	NA*
1. Settlements remaining settlements	NA*	NA*	NA*	NA*	NA*
2. Land converted to settlements	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
F. Other land	NA*	NA*	NA*	NA*	NA*
1. Other land remaining other land	NA*	NA*	NA*	NA*	NA*
2. Land converted to other land	NA*	NA*	NA*	NA*	NA*
3. Other [g]	NA*	NA*	NA*	NA*	NA*
G. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
Harvested wood products	NA*	NA*	NA*	NA*	NA*

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] Parties that use the LULUCF approach that is based on table 1 do not need to complete this table, but should indicate the approach in table 2. Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[c] For each category, enter the net emissions or removals reported in the most recent inventory submission for the corresponding inventory year. If a category differs from that used for

[d] Enter one reference level or base year/period value for each category. Explain in the biennial report how these values have been calculated.

[e] If applicable to the accounting approach chosen. Explain in this biennial report to which years or period the cumulative contribution refers to.

[f] Label each accounting approach and indicate where additional information is provided within this biennial report explaining how it was implemented, including all relevant accounting parameters (i.e. natural disturbances, caps).

[g] Specify what was used for the category “other”. Explain in this biennial report how each was defined and how it relates to the categories used for reporting under the Convention or its Kyoto Protocol.

* Not Applicable as LULUCF is excluded from the joint EU28 2020-target under the UNFCCC.

TABLE 4(A)I: REPORTING ON PROGRESS - IN ACHIEVING THE QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS – FURTHER INFORMATION ON MITIGATION ACTIONS RELEVANT TO THE CONTRIBUTION OF THE LAND USE, LAND-USE CHANGE AND FORESTRY SECTOR IN 2015

Table 4(a)I

Progress in achieving the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the contribution of the land use, land-use change and forestry sector in 20XX-2 = 2017-2 = 2015 [a, b]

	Net GHG emissions/removals from LULUCF categories [c] (kt CO2 eq)	Base year/period or reference level value [d] (kt CO2 eq)	Contribution from LULUCF for reported year (kt CO2 eq)	Cumulative contribution from LULUCF [e] (kt CO2 eq)	Accounting approach [f]
Total LULUCF	NA*	NA*	NA*	NA*	NA*
A: Forest land	NA*	NA*	NA*	NA*	NA*
1. Forest land remaining forest land	NA*	NA*	NA*	NA*	NA*
2. Land converted to forest land	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
B. Cropland	NA*	NA*	NA*	NA*	NA*
1. Cropland remaining cropland	NA*	NA*	NA*	NA*	NA*
2. Land converted to cropland	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
C. Grassland	NA*	NA*	NA*	NA*	NA*
1. Grassland remaining grassland	NA*	NA*	NA*	NA*	NA*
2. Land converted to grassland	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
D. Wetlands	NA*	NA*	NA*	NA*	NA*
1. Wetlands remaining wetlands	NA*	NA*	NA*	NA*	NA*
2. Land converted to wetlands	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
E. Settlements	NA*	NA*	NA*	NA*	NA*
1. Settlements remaining settlements	NA*	NA*	NA*	NA*	NA*
2. Land converted to settlements	NA*	NA*	NA*	NA*	NA*
3. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
F. Other land	NA*	NA*	NA*	NA*	NA*
1. Other land remaining other land	NA*	NA*	NA*	NA*	NA*
2. Land converted to other land	NA*	NA*	NA*	NA*	NA*
3. Other [g]	NA*	NA*	NA*	NA*	NA*
G. Other (please specify) [g]	NA*	NA*	NA*	NA*	NA*
Harvested wood products	NA*	NA*	NA*	NA*	NA*

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of

[b] Parties that use the LULUCF approach that is based on table 1 do not need to complete this table, but should indicate the approach in table 2. Parties should fill in a separate table for

[c] For each category, enter the net emissions or removals reported in the most recent inventory submission for the corresponding inventory year. If a category differs from that used for

[d] Enter one reference level or base year/period value for each category. Explain in the biennial report how these values have been calculated.

[e] If applicable to the accounting approach chosen. Explain in this biennial report to which years or period the cumulative contribution refers to.

[f] Label each accounting approach and indicate where additional information is provided within this biennial report explaining how it was implemented, including all relevant

[g] Specify what was used for the category "other". Explain in this biennial report how each was defined and how it relates to the categories used for reporting under the Convention or

* Not Applicable as LULUCF is excluded from the joint EU28 2020-target under the UNFCCC.

TABLE 4(A)II: REPORTING ON PROGRESS - IN ACHIEVEMENT OF THE QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS – FURTHER INFORMATION ON MITIGATION ACTIONS RELEVANT TO THE COUNTING OF EMISSIONS AND REMOVALS FROM THE LAND USE, LAND-USE CHANGE AND FORESTRY SECTOR IN RELATION TO ACTIVITIES UNDER ARTICLE 3, PARAGRAPHS 3 AND 4, OF THE KYOTO PROTOCOL

Table 4(a)II

Progress in achievement of the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the counting of emissions and removals from the land use, land-use change and forestry sector in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol [a,b,c]

INFORMATION TABLE ON ACCOUNTING FOR ACTIVITIES UNDER ARTICLES 3.3 AND 3.4 OF THE KYOTO PROTOCOL: 2013-2020

Commitment period accounting: NA
Annual accounting: NA
Number of the reported year in the commitment period: 0

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	Base year[d]	Net emissions/removals[e]									Accounting Parameters[h]	Accounting Quantity[i]
		2013	2014	2015	2016	2017	2018	2019	2020[f]	Total[g]		
	(kt CO2 eq)											
A. Article 3.3 activities												
A.1. Afforestation and Reforestation												
A.1.1. Units of land not harvested since the beginning of the commitment period[j]		NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*			
A.1.2. Units of land harvested since the beginning of the commitment period[j]												
A.2. Deforestation		NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*			
B. Article 3.4 activities												
B.1. Forest Management (if elected)		NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*			
3.3 offset[k]												
Forest management cap[l]											NA*	
B.2. Cropland Management (if elected)	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*			
B.3. Grazing Land Management (if elected)	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*			
B.4. Revegetation (if elected)	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*			

Note: 1 kt CO2 eq equals 1 Gg CO2 eq.

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b Developed country Parties with a quantified economy-wide emission reduction target as communicated to the secretariat and contained in document FCCC/SB/2011/INF.1/Rev.1 or any update to that document, that are Parties to the Kyoto Protocol, may use table 4(a)II for reporting of accounting quantities if LULUCF is contributing to the attainment of that target.

c Parties can include references to the relevant parts of the national inventory report, where accounting methodologies regarding LULUCF are further described in the documentation box or in the biennial reports.

d Net emissions and removals in the Party's base year, as established by decision 9/CP.2.

e All values are reported in the information table on accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, of the CRF for the relevant inventory year as reported in the current submission and are automatically entered in this table.

f Additional columns for relevant years should be added, if applicable.

g Cumulative net emissions and removals for all years of the commitment period reported in the current submission.

h The values in the cells "3.3 offset" and "Forest management cap" are absolute values.

i The accounting quantity is the total quantity of units to be added to or subtracted from a Party's assigned amount for a particular activity in accordance with the provisions of Article 7, paragraph 4, of the Kyoto Protocol.

j In accordance with paragraph 4 of the annex to decision 16/CMP.1, debits resulting from harvesting during the first commitment period following afforestation and reforestation since 1990 shall not be greater than the credits accounted for on that unit of land.

k In accordance with paragraph 10 of the annex to decision 16/CMP.1, for the first commitment period a Party included in Annex I that incurs a net source of emissions under the provisions of Article 3 paragraph 3, may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

l In accordance with paragraph 11 of the annex to decision 16/CMP.1, for the first commitment period of the Kyoto Protocol only, additions to and subtractions from the assigned amount of a Party resulting from Forest management under Article 3, paragraph 4, after the application of paragraph 10 of the annex to decision 16/CMP.1 and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

Documentation box:

* Not Applicable as LULUCF is excluded from the joint EU28 2020-target under the UNFCCC.

TABLE 4(B): REPORTING ON PROGRESS - IN ACHIEVEMENT OF THE QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS – FURTHER INFORMATION ON THE USE (I.E: RETIREMENT) OF KYOTO PROTOCOL UNITS (AAUS, ERUS, CERS TCERS AND LCERS) AND OTHER UNITS

Table 4(b)

Reporting on progress [a, b, c]

Units of market based mechanisms			*Year*	
			20XX-3 = 2014	20XX-2 = 2015
Kyoto Protocol units [d]	***Kyoto Protocol units***	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
	AAUs	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
	ERUs	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
	CERs	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
	tCERs	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
	lCERs	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
Other units [,d,e]	***Units from market-based mechanisms***	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
	Units from other market-based	*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*
Total		*(number of units)*	NA*	NA*
		(kt CO2 eq)	NA*	NA*

Note: 20XX is the latest reporting year.

Abbreviations: AAUs = assigned amount units, CERs = certified emission reductions, ERUs = emission reduction units, lCERs = long-term certified emission reductions, tCERs = temporary certified emission reductions.

[a] Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

[b] For each reported year, information reported on progress made towards the emission reduction target shall include, in addition to the information noted in paragraphs 9(a-c) of the reporting guidelines, on the use of units from market-based mechanisms.

[c] Parties may include this information, as appropriate and if relevant to their target.

[d] Units surrendered by that Party for that year that have not been previously surrendered by that or any other Party.

[e] Additional columns for each market-based mechanism should be added, if applicable.

* Not Applicable as the use of CERs and ERUs cannot be quantified at the time of reporting.

TABLE 5: SUMMARY OF KEY VARIABLES AND ASSUMPTIONS USED IN THE PROJECTIONS ANALYSIS

Table 5											
Summary of key variables and assumptions used in the projections analysis [a]											
		Historical [b]*						Projected**			
Key underlying assumptions	Unit	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
GDP growth rate	% p.a.	1.5	3.0	3.7	2.3	1.9	1.6	1.9	1.2	1.6	1.6
Population	thousands	5,135	5,216	5,330	5,411	5,535	5,660	5,800	6,000	6,100	6,100
Population growth	% p.a.	0.10	0.37	0.30	0.24	0.44	0.59	0.35	0.67	0.33	0.00
International oil price***	USD / boe	23.73	17.02	28.50	54.52	79.50	45.30	70.74	81.72	92.43	92.43
International coal price***	USD / boe	10.25	10.73	8.78	15.30	23.58	14.09	14.46	15.83	16.93	16.93
International gas price***	USD / boe	NA	10.82	15.72	42.82	38.03	29.47	34.59	47.86	58.84	58.84
EU ETS Carbon price	EUR(2010)/tCO2	NA	NA	NA	22.00	15.00	7.79	5.97	7.57	10.07	10.07

[a] Parties should include key underlying assumptions as appropriate.

[b] Parties should include historical data used to develop the greenhouse gas projections reported.

* In general the starting point for the GHG projection is the latest historic GHG inventory with the future delevelopment projected on the basis of the projected parameters only - such as projected GDP, projected fuel prices etc. (i.e. not historical parameters). Therefore the historic parameters shown here for 1990-2010 are shown only to follow the recommendation from the review of Denmark's BR2, although this is not in line with the purpose of the table: "include historical data used to develop the greenhouse gas projections reported".

** The key variables shown here for 2020-2035 are used for the 'with existing measures' (WEM) scenario. The results are shown in table 6(a).

*** Calculated from EUR/GJ with an exchange rate of 1.1086475 USD/EUR and a conversion factor of 6.1 GJ/boe (the higher heating value).

TABLE 6(A): INFORMATION ON UPDATED GREENHOUSE GAS PROJECTIONS UNDER A 'WITH MEASURES' SCENARIO

Table 6(a)

Information on updated greenhouse gas projections under a 'with measures' scenario [a] *

	GHG emissions and removals [b] (kt CO2 eq)							GHG emission projections (kt CO2 eq)	
	Base year	1990	1995	2000	2005	2010	20XX[c]-3 =2015	2020#	2030
Sector [d,e]									
Energy**	42885	42885	49634	42129	38276	36542	22552	19422	25807
Transport	10734	10734	12093	12285	13242	13125	12336	12325	12029
Industry/industrial processes***	2343	2343	2878	3631	2789	2034	1992	1910	1824
Agriculture	12631	12631	12079	11228	10788	10326	10299	10572	10702
Forestry/LULUCF****	4902	4902	4190	4208	5240	-797	4153	2444	2123
Waste management/waste	1763	1763	1598	1513	1276	1190	1153	861	908
Other (specify)									
Memo item: International bunkers	**4784**	**4784**	**6869**	**6400**	**4938**	**4513**	**4983**	**5231**	**5302**
Memo item: International Aviation	1748	1748	1841	2336	2560	2425	2652	2899	2971
Memo item: International Navigation	3036	3036	5027	4064	2378	2088	2331	2331	2331
Gas									
CO2 emissions including net CO2 from LULUCF****	59664	59664	66888	59316	57426	48851	39618	32686	41029
CO2 emissions excluding net CO2 from LULUCF	54808	54808	62752	55170	52257	49727	35559	32686	39005
CH4 emissions including CH4 from LULUCF****	7643	7643	8078	7943	7715	7399	6909	6518	6717
CH4 emissions excluding CH4 from LULUCF	7624	7624	8051	7907	7671	7347	6849	6518	6651
N2O emissions including N2O from LULUCF****	7909	7909	7161	6953	5499	5166	5216	1614	5505
N2O emissions excluding N2O from LULUCF	7882	7882	7134	6926	5472	5139	5182	1614	5473
HFCs	NO,NA	NO,NA	241	704	933	950	634	428	123
PFCs	NO,NA	NO,NA	1	23	19	19	5	3	1
SF6	42	42	102	56	20	36	103	42	16
NF3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NA,NO	NA,NO
Other (specify)									
Total with LULUCF [f] ****	**75259**	**75259**	**82472**	**74994**	**71611**	**62420**	**52484**	**47534**	**53392**
Total without LULUCF	**70356**	**70356**	**78282**	**70786**	**66371**	**63217**	**48331**	**45090**	**51269**

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", at a minimum Parties shall report a 'with measures' scenario, and may report 'without measures' and 'with additional measures' scenarios. If a Party chooses to report 'without measures' and/or 'with additional measures' scenarios they are to use tables 6(b) and/or 6(c), respectively. If a Party does not choose to report 'without measures' or 'with additional measures' scenarios then it should not include tables 6(b) or 6(c) in the biennial report.

[b] Emissions and removals reported in these columns should be as reported in the latest GHG inventory and consistent with the emissions and removals reported in the table on GHG emissions and trends provided in this biennial report. Where the sectoral breakdown differs from that reported in the GHG inventory Parties should explain in their biennial report how the inventory sectors relate to the sectors reported in this table.

[c] 20XX is the reporting due-date year (i.e. 2014 for the first biennial report).

[d] In accordance with paragraph 34 of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", projections shall be presented on a sectoral basis, to the extent possible, using the same sectoral categories used in the policies and measures section. This table should follow, to the extent possible, the same sectoral categories as those listed in paragraph 17 of those guidelines, namely, to the extent appropriate, the following sectors should be considered: energy, transport, industry, agriculture, forestry and waste management.

[e] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors (i.e. cross-cutting), as appropriate.

[f] Parties may choose to report total emissions with or without LULUCF, as appropriate.

* Denmark without Greenland and the Faroe Islands. CO2 and totals are with indirect CO2 emissions. The memo items are not included in the totals.

** The IPCC category "Energy" excluding the subcategory "Transport".

*** The IPCC category "Industrial processes and product use".

**** Not Applicable for the assessment of Denmark's contribution to progress towards the joint EU28 2020 under the UNFCCC as LULUCF is excluded from this target.

To be seen as Denmark's projected contribution to the joint EU28 target for 2020 (i.e. without Greenland and the Faroe Islands and without LULUCF, but with indirect CO2 emissions), however without CO2 from international aviation. When including "inventory CO2 from international aviation" (based on fuel sold to aircrafts starting from Danish airports) as a proxy for CO2 from international aviation activities reported by aviation entities registered in the Danish quota register ("entity CO2 from international and domestic aviation" based on fuel used by Danish entities) in accordance with guidance from the European Commission, the "Total without LULUCF, with indirect (with CO2 from international aviation)" is in kt CO2eq.: 47,989.55(2020).

TABLE 6(B): INFORMATION ON UPDATED GREENHOUSE GAS PROJECTIONS UNDER A 'WITHOUT MEASURES' SCENARIO

Table 6(b)

Information on updated greenhouse gas projections under a 'without measures' scenario [a] *

	GHG emissions and removals [b] (kt CO2 eq)							GHG emission projections (kt CO2 eq)	
	Base year	1990	1995	2000	2005	2010 #	20XX[c]-3 =2015	2020	2030
Sector [d,e]									
Energy**	42885	42885	54685	57466	58440	60100	52301	59201	68690
Transport	10734	10734	12093	12285	13242	13125	12336	12025	12229
Industry/industrial processes***	2343	2343	2878	3631	2945	2409	2569	2745	2659
Agriculture	12631	12631	12810	12689	12688	12226	12199	12350	12480
Forestry/LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
Waste management/waste	1763	1763	1724	1750	1676	1728	1691	1699	1625
Other (specify: Memo item: International bunkers)	4784	4784	6869	6400	4938	4513	4983	5231	5302
Memo item: International Aviation	1748	1748	1841	2336	2560	2425	2652	2899	2971
Memo item: International Navigation	3036	3036	5027	4064	2378	2088	2331	2331	2331
Gas									
CO2 emissions including net CO2 from LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO2 emissions excluding net CO2 from LULUCF	54808	54808	67803	70507	72420	73285	65278	72134	82058
CH4 emissions including CH4 from LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
CH4 emissions excluding CH4 from LULUCF	7624	7624	8177	8144	8071	7885	7417	7386	7398
N2O emissions including N2O from LULUCF	NE	NE	NE	NE	NE	NE	NE	NE	NE
N2O emissions excluding N2O from LULUCF	7882	7882	7865	8388	7372	7039	7082	7193	7251
HFCs	NO,NA	NO,NA	IE	IE	IE	IE	IE	IE	IE
PFCs	NO,NA	NO,NA	IE	IE	IE	IE	IE	IE	IE
SF6	IE	IE	IE	IE	IE	IE	IE	IE	IE
NF3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA
Other (specify)									
Total F-gases****	42	42	344	782	1127	1379	1319	1307	975
Total with LULUCF [f]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Total without LULUCF	70356	70356	84190	87821	88990	89588	81095	88020	97682

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", at a minimum Parties shall report a 'with measures' scenario, and may report 'without measures' and 'with additional measures' scenarios. If a Party chooses to report 'without measures' and/or 'with additional measures' scenarios they are to use tables 6(b) and/or 6(c), respectively. If a Party does not choose to report 'without measures' or 'with additional measures' scenarios then it should not include tables 6(b) or 6(c) in the biennial report.

[b] Emissions and removals reported in these columns should be as reported in the latest GHG inventory and consistent with the emissions and removals reported in the table on GHG emissions and trends provided in this biennial report. Where the sectoral breakdown differs from that reported in the GHG inventory Parties should explain in their biennial report how the inventory sectors relate to the sectors reported in this table.

[c] 20XX is the reporting due-date year (i.e. 2014 for the first biennial report).

[d] In accordance with paragraph 34 of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", projections shall be presented on a sectoral basis, to the extent possible, using the same sectoral categories used in the policies and measures section. This table should follow, to the extent possible, the same sectoral categories as those listed in paragraph 17 of those guidelines, namely, to the extent appropriate, the following sectors should be considered: energy, transport, industry, agriculture, forestry and waste management.

[e] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors (i.e. cross-cutting), as appropriate.

[f] Parties may choose to report total emissions with or without LULUCF, as appropriate.

* Denmark without Greenland and the Faroe Islands. CO2 and totals are with indirect CO2 emissions. The memo items are not included in the totals. Estimated emissions if the policies and measures implemented since 1990 have not been implemented.

** The IPCC category "Energy" excluding the subcategory "Transport".

*** The IPCC category "Industrial processes and product use".

**** Total F-gases: HFCs + PFCs + SF6

Annual average of estimates for the period 2008-2012

TABLE 6(C): INFORMATION ON UPDATED GREENHOUSE GAS PROJECTIONS UNDER A 'WITH ADDITIONAL MEASURES' SCENARIO

Table 6(c)

Information on updated greenhouse gas projections under a 'with additional measures' scenario [a] *

	GHG emissions and removals [b] (kt CO2 eq)							GHG emission projections (kt CO2 eq)	
	Base year	1990	1995	2000	2005	2010	20XX[c]-3 =2015	2020	2030
Sector [d,e]									
Energy**	42885	42885	49634	42129	38276	36542	22552	NE#	NE#
Transport	10734	10734	12093	12285	13242	13125	12336	NE#	NE#
Industry/industrial processes***	2343	2343	2878	3631	2789	2034	1992	NE#	NE#
Agriculture	12631	12631	12079	11228	10788	10326	10299	NE#	NE#
Forestry/LULUCF****	4902	4902	4190	4208	5240	-797	4153	NE#	NE#
Waste management/waste	1763	1763	1598	1513	1276	1190	1153	NE#	NE#
Other (specify)									
Memo item: International bunkers	4784	4784	6869	6400	4938	4513	4983	NE#	NE#
Memo item: International Aviation	1748	1748	1841	2336	2560	2425	2652	NE#	NE#
Memo item: International Navigation	3036	3036	5027	4064	2378	2088	2331	NE#	NE#
Gas									
CO2 emissions including net CO2 from LULUCF****	59664	59664	66888	59316	57426	48851	39618	NE#	NE#
CO2 emissions excluding net CO2 from LULUCF	54808	54808	62752	55170	52257	49727	35559	NE#	NE#
CH4 emissions including CH4 from LULUCF****	7643	7643	8078	7943	7715	7399	6909	NE#	NE#
CH4 emissions excluding CH4 from LULUCF	7624	7624	8051	7907	7671	7347	6849	NE#	NE#
N2O emissions including N2O from LULUCF****	7909	7909	7161	6953	5499	5166	5216	NE#	NE#
N2O emissions excluding N2O from LULUCF	7882	7882	7134	6926	5472	5139	5182	NE#	NE#
HFCs	NO,NA	NO,NA	241	704	933	950	634	NE#	NE#
PFCs	NO,NA	NO,NA	1	23	19	19	5	NE#	NE#
SF6	42	42	102	56	20	36	103	NE#	NE#
NF3	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NE#	NE#
Other (specify)									
Total with LULUCF [f]****	75259	75259	82472	74994	71611	62420	52484	NE#	NE#
Total without LULUCF	70356	70356	78282	70786	66371	63217	48331	NE#	NE#

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

[a] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", at a minimum Parties shall report a 'with measures' scenario, and may report 'without measures' and 'with additional measures' scenarios. If a Party chooses to report 'without measures' and/or 'with additional measures' scenarios they are to use tables 6(b) and/or 6(c), respectively. If a Party does not choose to report 'without measures' or 'with additional measures' scenarios then it should not include tables 6(b) or 6(c) in the biennial report.

[b] Emissions and removals reported in these columns should be as reported in the latest GHG inventory and consistent with the emissions and removals reported in the table on GHG emissions and trends provided in this biennial report. Where the sectoral breakdown differs from that reported in the GHG inventory Parties should explain in their biennial report how the inventory sectors relate to the sectors reported in this table.

[c] 20XX is the reporting due-date year (i.e. 2014 for the first biennial report).

[d] In accordance with paragraph 34 of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", projections shall be presented on a sectoral basis, to the extent possible, using the same sectoral categories used in the policies and measures section. This table should follow, to the extent possible, the same sectoral categories as those listed in paragraph 17 of those guidelines, namely, to the extent appropriate, the following sectors should be considered: energy, transport, industry, agriculture, forestry and waste management.

[e] To the extent possible, the following sectors should be used: energy, transport, industry/industrial processes, agriculture, forestry/LULUCF, waste management/waste, other sectors (i.e. cross-cutting), as appropriate.

[f] Parties may choose to report total emissions with or without LULUCF, as appropriate.

* Denmark without Greenland and the Faroe Islands. CO2 and totals are with indirect CO2 emissions. The memo items are not included in the totals.

** The IPCC category "Energy" excluding the subcategory "Transport".

*** The IPCC category "Industrial processes and product use".

**** Not Applicable for the assessment of Denmark's contribution to progress towards the joint EU28 2020 under the UNFCCC as LULUCF is excluded from this target.

The overall climate and energy objective of the Danish Government is to implement measures to ensure that Denmark can meet its greenhouse gas reduction obligations under the EU's Climate and Energy Package and thereby contribute to the acheivement of the EU28 joint target for 2020 under the UNFCCC and to the achievement of the EU28+Iceland joint target under the second commitment period of the Kyoto Protocol. As the overall result of the latest "with measures" projection - with the effect of all adopted and implemented policies and measures - is that Denmark will achieve its greenhouse gas emission reduction target under the EU Climate and Energy Package, there has not been a need for adopting additional measures and prepare a "with additional measures" projection.

TABLE 7: PROVISION OF PUBLIC FINANCIAL SUPPORT: SUMMARY INFORMATION IN 2015 AND 2016

Table 7

Provision of public financial support: summary information in 20XX-3 [a]

Year: 2015

Allocation channels	Domestic currency					USD [b]				
	Core/ general [c,1]	Climate-specific [d,2]				Core/ general [c,1]	Climate-specific [d,2]			
		Mitigation	Adaptation	Cross-cutting [e]	Other [f]		Mitigation	Adaptation	Cross-cutting [e]	Other [f]
Total contributions through multilateral channels:	**1,724,196,530**	**60,376,475**	**19,400,000**	**160,458,725**	**43,221,785**	**256,275,322**	**8,974,035**	**2,883,512**	**23,849,724**	**6,424,254**
Multilateral climate change funds [g]	100,000,000	0	0	101,035,000	0	14,863,463	0	0	15,017,300	0
Other multilateral climate change funds [h]	0	0	0	0	7,428,490	0	0	0	0	1,104,131
Multilateral financial institutions, including regional development banks	1,005,308,130	60,376,475	4,400,000	37,673,725	35,793,295	149,423,607	8,974,035	653,992	5,599,620	5,320,123
Specialized United Nations bodies	618,888,400	0	15,000,000	21,750,000	0	91,988,251	0	2,229,520	3,232,803	0
Total contributions through bilateral, regional and other channels		**236,095,985**	**87,279,845**	**601,156,835**	**0**		**35,092,041**	**12,972,808**	**89,352,727**	**0**
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		**296,472,460**	**106,679,845**	**761,615,560**	**43,221,785**		**44,066,076**	**15,856,320**	**113,202,451**	**6,424,254**
Total climate specific finance		**1,207,989,650**					**179,549,100**			

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation on methodology used for currency exchange for the information provided in table 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate: USD 1 = DKK 6.727907

Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

Table 7

Provision of public financial support: summary information in 20XX-2 [a]

Year: 2016

Allocation channels	Domestic currency					USD [b]				
	Core/ general [c,1]	Climate-specific [d,2]				Core/ general [c,1]	Climate-specific [d,2]			
		Mitigation	Adaptation	Cross-cutting [e]	Other [f]		Mitigation	Adaptation	Cross-cutting [e]	Other [f]
Total contributions through multilateral channels:	**1,612,561,003**	**105,096,975**	**62,030,309**	**119,803,678**	**7,428,485**	**239,546,725**	**15,612,207**	**9,214,633**	**17,796,895**	**1,103,505**
Multilateral climate change funds [g]	100,000,000	0	44,219,978	50,000,000	0	14,855,049	0	6,568,899	7,427,524	0
Other multilateral climate change funds [h]	0	0	0	0	7,428,485	0	0	0	0	1,103,505
Multilateral financial institutions, including regional development banks	1,078,469,757	77,665,395	60,331	55,486,873	0	160,207,210	11,537,232	8,962	8,242,602	0
Specialized United Nations bodies	434,091,246	27,431,580	17,750,000	14,316,805	0	64,484,467	4,074,975	2,636,771	2,126,768	0
Total contributions through bilateral, regional and other channels		**241,306,872**	**186,125,839**	**571,314,381**	**0**		**35,846,254**	**27,649,084**	**84,869,031**	**0**
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		**346,403,847**	**248,156,148**	**691,118,059**	**7,428,485**		**51,458,461**	**36,863,717**	**102,665,925**	**1,103,505**
Total climate specific finance		**1,293,106,538**					**192,091,608**			

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should provide an explanation on methodology used for currency exchange for the information provided in table 7, 7(a) and 7(b) in the documentation box.

[c] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[d] Parties should explain in their biennial reports how they define funds as being climate-specific.

[e] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

[f] Please specify.

[g] Multilateral climate change funds listed in paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

[h] Other multilateral climate change funds as referred in paragraph 17(b) of the "UNFCCC biennial reporting guidelines for developed country Parties" in decision 2/CP.17.

Exchange rate (USD 1 = DKK 6.731718)

Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

TABLE 7(A): PROVISION OF PUBLIC FINANCIAL SUPPORT: CONTRIBUTION THROUGH MULTILATERAL CHANNELS IN 2015 AND 2016

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 20XX-3 = 2015 [a]

Donor funding	Total amount				Status [b,3]	Funding source [4]	Financial instrument [5]	Type of support [6]	Sector [c,7]
	Core /general [d,1]		Climate-specific [e,2]		Committed Disbursed	ODA OOF Other [f]	Grant Concessional loan Non-concessional loan Equity Other [f]	Mitigation Adaptation Cross-cutting [g] Other [f]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [f] Not applicable
	DKK	USD	DKK	USD					
Total contributions through multilateral channels	**1,724,196,530.00**	**256,275,321.58**	**283,456,985.00**	**42,131,525.45**					
Multilateral climate change funds	**100,000,000.00**	**14,863,463.48**	**108,463,490.00**	**16,121,431.23**					
1. Global Environment Facility	100,000,000.00	14,863,463.48			Disbursed	ODA	Grant		
2. Least Developed Countries Fund									
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund			100,000,000.00	14,863,463.48	Disbursed	ODA	Grant	Cross-cutting	Environmental policy and administrative management / 41010
6. UNFCCC Trust Fund for Supplementary Activities			1,035,000.00	153,836.85	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
7. Other multilateral climate change funds	0.00	0.00	7,428,490.00	1,104,130.90					
7.1 Other (Multilateral Fund for the Implementation of the Montreal Protocol)			*7,428,490.00*	*1,104,130.90*	*Disbursed*	*ODA*	*Grant*	*Other (NA)*	*Environmental policy and administrative management / 41010*
Multilateral financial institutions, including regional development banks	**1,005,308,130.00**	**149,423,606.78**	**138,243,495.00**	**20,547,771.39**					
1. World Bank	624,220,000.00	92,780,711.74	31,379,820.00	4,664,128.09					
2. International Finance Corporation	12,500,000.00	1,857,932.94	2,500,000.00	371,586.59	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
3. African Development Bank	195,439,800.00	29,049,123.30	556,155.00	82,663.90					
4. Asian Development Bank	66,615,850.00	9,901,422.54			Disbursed	ODA	Grant		
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank			37,440,500.00	5,564,955.04	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010
7. Other	106,532,480.00	15,834,416.26	66,367,020.00	9,864,437.78					
(7.)1.1 Other (World Bank (xxx))									
(7.)1.2 Other (World Bank (IDA))	*614,220,000.00*	*91,294,365.39*	*4,600,000.00*	*683,719.32*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Water sector policy and administrative management / 14010*
(7.)1.3 Other (World Bank (IBRD))	*10,000,000.00*	*1,486,346.35*	*22,379,820.00*	*3,326,416.37*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Energy policy and administrative management / 23110*
(7.)1.4 Other (World Bank (IBRD))			*4,400,000.00*	*653,992.39*	*Disbursed*	*ODA*	*Grant*	*Adaptation*	*Other (68% Food aid/Food security programmes / 52010; 32% Environmental policy and administrative management / 41010)*
(7.)3.1 Other (African Development Bank (yyy))	*15,881,220.00*	*2,360,499.34*	*556,155.00*	*82,663.90*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Other (89% Energy generation, renewable sources – multiple technologies / 23210; 11% Financial policy and administrative management / 24010)*
(7.)3.2 Other (African Development Bank (AFDF))	*179,558,580.00*	*26,688,623.97*			*Disbursed*	*ODA*	*Grant*		
7.1 Other (GGGI)			*30,573,725.00*	*4,544,314.45*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Environmental policy and administrative management / 41010*
7.2 Other (OECD)									
7.3 Other (IEA)									
7.4 Other (Inter-Governmental Authority on Development)									
7.5 Other (CGIAR)	*70,000,000.00*	*10,404,424.44*			*Disbursed*	*ODA*	*Grant*		
7.6 Other (Nordic Development Fund)	*36,532,480.00*	*5,429,991.82*			*Disbursed*	*ODA*	*Grant*		
7.7 Other (Other multilateral institutions)			*35,793,295.00*	*5,320,123.33*	*Disbursed*	*ODA*	*Grant*	*Other (NA)*	*Other (NA)*
Specialized United Nations bodies	**618,888,400.00**	**91,988,251.32**	**36,750,000.00**	**5,462,322.83**					
1. United Nations Development Programme	345,000,000.00	51,278,949.01	0.00	0.00					
1.0 UNDP (Total)	*345,000,000.00*	*51,278,949.01*			*Disbursed*	*ODA*	*Grant*		
2. United Nations Environment Programme	30,000,000.00	4,459,039.04	15,000,000.00	2,229,519.52					
2.0 UNEP (Total)	*30,000,000.00*	*4,459,039.04*	*15,000,000.00*	*2,229,519.52*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Environmental policy and administrative management / 41010*
3. Other	243,888,400.00	36,250,263.27	21,750,000.00	3,232,803.31					
3.1 Other (FAO)			*15,000,000.00*	*2,229,519.52*	*Disbursed*	*ODA*	*Grant*	*Adaptation*	*Agricultural development / 31120*
3.2 Other (IFAD)	*28,000,000.00*	*4,161,769.77*			*Disbursed*	*ODA*	*Grant*		
3.3 Other (UNIDO)	*5,888,400.00*	*875,220.18*			*Disbursed*	*ODA*	*Grant*		
3.4 Other (WPF)	*210,000,000.00*	*31,213,273.31*			*Disbursed*	*ODA*	*Grant*		
3.5 Other (UNICEF)									
3.6 Other (United Nations Office for Project Services)			*5,500,000.00*	*817,490.49*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Environmental policy and administrative management / 41010*
3.7 Other (United Nations Office of the President of the General Assembly)			*1,250,000.00*	*185,793.29*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Sectors not specified / 99810*

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.727907)

Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 20XX-2 = 2016 [a]

Donor funding	Total amount				Status [b,3]	Funding source [4]	Financial instrument [5]	Type of support [6]	Sector [c,7]
	Core /general [d,1]		Climate-specific [e,2]		Committed Disbursed	ODA OOF Other [f]	Grant Concessional loan Non-concessional loan Equity Other [f]	Mitigation Adaptation Cross-cutting [g] Other [f]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [f] Not applicable
	DKK	USD	DKK	USD					
Total contributions through multilateral channels	**1,612,561,003.27**	**239,546,725.41**	**294,359,446.76**	**43,727,239.73**					
Multilateral climate change funds	**100,000,000.00**	**14,855,048.89**	**101,648,463.00**	**15,099,928.87**					
1. Global Environment Facility	100,000,000.00	14,855,048.89			Disbursed	ODA	Grant		
2. Least Developed Countries Fund			44,219,978.00	6,568,899.35	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund			50,000,000.00	7,427,524.44	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds	0.00	0.00	7,428,485.00	1,103,505.08					
7.1 Other (Multilateral Fund for the Implementation of the Montreal Protocol)			*7,428,485.00*	*1,103,505.08*	*Disbursed*	*ODA*	*Grant*	*Other (NA)*	*Environmental policy and administrative management / 41010*
Multilateral financial institutions, including regional development banks	**1,078,469,757.42**	**160,207,209.72**	**133,212,599.07**	**19,788,796.72**					
1. World Bank	667,220,000.00	99,115,857.20	89,810,164.62	13,341,343.86					
2. International Finance Corporation	7,000,000.00	1,039,853.42	4,275,000.00	635,053.34	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010
3. African Development Bank	404,249,757.42	60,051,499.10	49,974.68	7,423.76					
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other	0.00	0.00	39,077,459.78	5,804,975.75					
(7.)1.1 Other (World Bank (xxx))			*3,000,000.00*	*445,651.47*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Energy policy and administrative management / 23110*
(7.)1.2 Other (World Bank (IDA))	*664,220,000.00*	*98,670,205.73*			*Disbursed*	*ODA*	*Grant*		
(7.)1.3 Other (World Bank (IBRD))	*3,000,000.00*	*445,651.47*	*22,138,357.89*	*3,288,663.89*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Agricultural development / 31120*
(7.)1.4 Other (World Bank (IBRD))			*64,671,806.73*	*9,607,028.51*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Other (73% Environmental policy and administrative management / 41010; 20% Energy policy and administrative management / 23110; 7% Wind energy / 23240)*
(7.)3.1 Other (African Development Bank (yyy))	*1,282,163.62*	*190,466.03*	*49,974.68*	*7,423.76*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Energy generation, renewable sources – multiple technologies / 23210*
(7.)3.2 Other (African Development Bank (AFDF))	*402,967,593.80*	*59,861,033.07*			*Disbursed*	*ODA*	*Grant*		
7.1 Other (GGGI)			*29,073,515.04*	*4,318,884.87*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Environmental policy and administrative management / 41010*
7.2 Other (OECD)			*1,543,613.74*	*229,304.57*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Other (78% Environmental policy and administrative management / 41010; 22% Research/scientific institutions / 43082)*
7.3 Other (IEA)			*8,400,000.00*	*1,247,824.11*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Other (76% Environmental policy and administrative management / 41010; 24% Energy policy and administrative management / 23110)*
7.4 Other (Inter-Governmental Authority on Development)			*60,331.00*	*8,962.20*	*Disbursed*	*ODA*	*Grant*	*Adaptation*	*Agricultural land resources / 31130*
7.5 Other (CGIAR)									
7.6 Other (Nordic Development Fund)									
7.7 Other (Other multilateral institutions)									
Specialized United Nations bodies	**434,091,245.85**	**64,484,466.80**	**59,498,384.69**	**8,838,514.13**					
1. United Nations Development Programme	210,000,000.00	31,195,602.67	27,431,579.69	4,074,974.57					
1.0 UNDP (Total)	*210,000,000.00*	*31,195,602.67*	*27,431,579.69*	*4,074,974.57*	*Disbursed*	*ODA*	*Grant*	*Mitigation*	*Other (73% Energy policy and administrative management / 23110; 27%*
2. United Nations Environment Programme	9,000,000.00	1,336,954.40	7,745,805.00	1,150,643.12					
2.1 UNEP (Project 1)	*9,000,000.00*	*1,336,954.40*	*6,245,805.00*	*927,817.39*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Environmental policy and administrative management / 41010*
2.2 UNEP (Project 2)			*1,500,000.00*	*222,825.73*	*Disbursed*	*ODA*	*Grant*	*Adaptation*	*Environmental policy and administrative management / 41010*
3. Other	215,091,245.85	31,951,909.73	24,321,000.00	3,612,896.44					
3.1 Other (FAO)			*8,000,000.00*	*1,188,403.91*	*Disbursed*	*ODA*	*Grant*	*Adaptation*	*Civilian peace-building, conflict prevention and resolution / 15220*
3.2 Other (IFAD)			*2,571,000.00*	*381,923.31*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Agricultural policy and administrative management / 31110*
3.3 Other (UNIDO)	*5,091,245.85*	*756,307.06*			*Disbursed*	*ODA*	*Grant*		
3.4 Other (WPF)	*210,000,000.00*	*31,195,602.67*			*Disbursed*	*ODA*	*Grant*		
3.5 Other (UNICEF)			*8,250,000.00*	*1,225,541.53*	*Disbursed*	*ODA*	*Grant*	*Adaptation*	*Civilian peace-building, conflict prevention and resolution / 15220*
3.6 Other (United Nations Office for Project Services)			*5,500,000.00*	*817,027.69*	*Disbursed*	*ODA*	*Grant*	*Cross-Cutting*	*Environmental policy and administrative management / 41010*
3.7 Other (United Nations Office of the President of the General Assembly)									

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[c] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[d] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[e] Parties should explain in their biennial reports how they define funds as being climate-specific.

[f] Please specify.

[g] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

Exchange rate (USD 1 = DKK 6.727907)

Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

TABLE 7(B): PROVISION OF PUBLIC FINANCIAL SUPPORT: CONTRIBUTION THROUGH BILATERAL, REGIONAL AND OTHER CHANNELS IN 2015 AND 2016

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 20XX-3 = 2015 [a]

Recipient country/ region/project/programme [b]	Total amount		Status [c,3]	Funding source [4]	Financial instrument [5]	Type of support [6]	Sector [d,7]	Recipient country/ region/project/programme [b]	Additional Information [e]
Project/programme/activity	Climate-specific [f,2]		Committed Disbursed	ODA OOF Other [g]	Grant Concessional loan Non-concessional loan Equity Other [g]	Mitigation Adaptation Cross-cutting [h] Other [g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [g]	Recipient country or region	
	DKK	USD							
Afghanistan	9,750,000	1,449,188	Disbursed	ODA	Grant	Mitigation	Public sector policy and administrative management / 15110	Afghanistan	CRS 2013001246 / Support to National Solidarity Programme (NSP)
Afghanistan	9,000,000	1,337,712	Disbursed	ODA	Grant	Cross-Cutting	Material relief assistance and services / 72010	Afghanistan	CRS 2013001248 / Support to DACAAR
Afghanistan	1,965	292	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300ab / Afghanistan Country Programme - TP 3: Growth and Employment
Afghanistan	18,500,000	2,749,741	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300ac / Afghanistan Country Programme - TP 3: Growth and Employment
Afghanistan	27,500,000	4,087,452	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300aa / Afghanistan Country Programme - TP 3: Growth and Employment
Africa, regional	248,580	36,948	Disbursed	ODA	Grant	Mitigation	Agricultural education/training / 31181	Africa, regional	CRS 2009002287 / Africa Commission. University, Research, Agro-Business initiative URABI, (FARA)
Africa, regional	672,310	99,929	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Africa, regional	CRS 2011001498aa / Support to Water Management in the SADC/Zambezi Region
Africa, regional	243,625	36,211	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Africa, regional	CRS 2014001040 / Opfølgning på Opportunity Africa 2014
Asia, regional	584,535	86,882	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	Asia, regional	CRS 2013001225 / CSR-facility: Fashion Links - Access to Sustainable Production
Asia, regional	1,000,055	148,643	Disbursed	ODA	Grant	Cross-Cutting	Security system management and reform / 15210	Asia, regional	CRS 2014001161 / JCLEC - core support to JCLEC strategic plan 2014-2019
Asia, regional	7,500,000	1,114,760	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Asia, regional	CRS 2015001246 / Climate Envelope 2015: IUCN - Mangroves for the Future Phase 3 (2015-18)
Bangladesh	13,993,490	2,079,917	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	Bangladesh	CRS 2010001680 / HYSAWA Fund Component
Bangladesh	904,385	134,423	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Bangladesh	CRS 2010001681 / Sector Policy Support Component
Bangladesh	2,160	321	Disbursed	ODA	Grant	Adaptation	Sectors not specified / 99810	Bangladesh	CRS 2013001119 / Climate Change Adaptation Pilot Project
Bangladesh	1,420,350	211,113	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221ab / Climate Change Adaptation and Mittigation Programme
Bangladesh	1,012,420	150,481	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221ac / Climate Change Adaptation and Mittigation Programme
Bangladesh	19,372,460	2,879,419	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221aa / Climate Change Adaptation and Mittigation Programme
Bangladesh	9,953,090	1,479,374	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Bangladesh	CRS 2015001187 / Climate Change Adaptation Project Phase II
Bolivia	602,300	89,523	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2010001402 / Administration, consultancies and management
Bolivia	2,705	402	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2010001403 / Adviser
Bolivia	859,820	127,799	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001339ab / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	12,661,920	1,882,000	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001339aa / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	7,850,460	1,166,850	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ab / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	6,396,135	950,687	Disbursed	ODA	Grant	Cross-Cutting	Forestry development / 31220	Bolivia	CRS 2013001340ac / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	441,240	65,584	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ad / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	1,065,065	158,306	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340aa / Bolivia Country Programme - part III: Promotion of Sustainable Natural Resource Management & Climate Change
Bolivia	378,265	56,223	Disbursed	ODA	Grant	Cross-Cutting	Energy research / 23182	Bolivia	CRS 2013001378ab / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	21,412,095	3,182,579	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378ac / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	1,406,465	209,049	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378ad / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	2,628,290	390,655	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378aa / Bolivia Country Programme - part I: Promotion of Inclusive and Sustainable Economic Growth
Bolivia	639,005	94,978	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Bolivia	CRS 2014001175 / Research and Outreach activities on Equitable and Sustainable Development, 2014-2017- Core Funding for Fundación INESAD
Burkina Faso	5,300,000	787,764	Disbursed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	Burkina Faso	CRS 2009002442 / Composante 1 Appui au PAGIRE 2
Burkina Faso	1,308,135	194,434	Disbursed	ODA	Grant	Adaptation	Agricultural policy and administrative management / 31110	Burkina Faso	CRS 2012001507ab / Appui à l'entrepreneuriat et au secteur privé agricole
Burkina Faso	4,723,270	702,042	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Burkina Faso	CRS 2012001507ac / Appui à l'entrepreneuriat et au secteur privé agricole
Burkina Faso	1,811,720	269,284	Disbursed	ODA	Grant	Adaptation	Agricultural financial services / 31193	Burkina Faso	CRS 2012001507aa / Appui à l'entrepreneuriat et au secteur privé agricole
Burkina Faso	8,758,355	1,301,795	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Burkina Faso	CRS 2012001508ab / Appui à l'amélioration des conditions cadres du secteur agricole
Burkina Faso	2,327,730	345,981	Disbursed	ODA	Grant	Adaptation	Agricultural policy and administrative management / 31110	Burkina Faso	CRS 2012001508aa / Appui à l'amélioration des conditions cadres du secteur agricole
Burkina Faso	633,265	94,125	Disbursed	ODA	Grant	Cross-Cutting	Forestry research / 31282	Burkina Faso	CRS 2015001132 / INERA - Restauration et amelioration de la productivite de peuplements de karite au BF
China (People's Republic of)	2,753,050	409,199	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	China (People's Republic of)	CRS 2008001543 / Renewable Energy Programme: Component 1 - institutional development
China (People's Republic of)	8,062,590	1,198,380	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	China (People's Republic of)	CRS 2008001544 / Renewable Energy Programme: Component 2 - innovative RE technologies
China (People's Republic of)	1,501,360	223,154	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	China (People's Republic of)	CRS 2008001545 / Renewable Energy Programme: Programme Administration
China (People's Republic of)	28,920	4,299	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	China (People's Republic of)	CRS 2008001546 / Renweable Energy Programme: International Programme Advisor
China (People's Republic of)	218,310	32,448	Disbursed	ODA	Grant	Mitigation	Energy research / 23182	China (People's Republic of)	CRS 2008001547 / Renewable Energy Programme: Monitoring and Reviews
Developing countries, unspecified	7,010,130	1,041,948	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2011001193 / Research projects/FFU incl. pilot projects from 2008. South and North driven from 2013
Developing countries, unspecified	70,440	10,470	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2012001176 / Climate Envelope 2012: Support for CCAP (Centre for Clean Air Policy) - MAIN- Peru
Developing countries, unspecified	11,655,925	1,732,474	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2012001278 / Research projects/FFU incl. pilot projects from 2008. South and North driven from 2013
Developing countries, unspecified	312,500	46,448	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2012001308 / Study: Evidence and Strategic Choices for the Green Growth Priority Area of Danida's Development Cooperation Strategy
Developing countries, unspecified	5,000,000	743,173	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2013001139 / IWGIA 2013-2015: Climate change partnership with indiginous peoples in South- and Southeast Asia - pro-poor REDD
Developing countries, unspecified	2,500,000	371,587	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2013001178 / Climate Envelope 2013 - World Bank-ESMAP, IEA and IISD - fossil fuel subsidy reform
Developing countries, unspecified	750,000	111,476	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	Developing countries, unspecified	CRS 2013001278 / CSR-Facility: Strengthen Danish efforts on Ethical Trade
Developing countries, unspecified	500,000	74,317	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	Developing countries, unspecified	CRS 2013001280 / CSR-facility. Fairtrade Mærket Danmark Fonden. Fairtrade for all: contribution to fivefold increase the Fairtrade consumption in Denmark by 2020
Developing countries, unspecified	6,000,000	891,808	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Developing countries, unspecified	CRS 2013001290 / Support to Global Water Partnership (GWP) 2013-18 (5 år)
Developing countries, unspecified	20,000,000	2,972,693	Disbursed	ODA	Grant	Cross-Cutting	Human rights / 15160	Developing countries, unspecified	CRS 2013001342 / International Work Group for Indigenous Affairs (IWGIA)
Developing countries, unspecified	202,135	30,044	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Developing countries, unspecified	CRS 2014001001 / Preparation and information of evaluations, evaluation studies and other studies
Developing countries, unspecified	11,345	1,686	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001041 / 3GF 2014-bevilling
Developing countries, unspecified	2,500,000	371,587	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2014001079 / International Research.
Developing countries, unspecified	26,930	4,003	Disbursed	ODA	Grant	Cross-Cutting	Relief co-ordination; protection and support services / 72050	Developing countries, unspecified	CRS 2014001096 / Evaluation of the Danish Humantarian Strategy 2010-2015
Developing countries, unspecified	216,150	32,127	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001106aa / Evaluation of the Danish Climate Change Funding to Developing Countries
Developing countries, unspecified	1,250,000	185,793	Disbursed	ODA	Grant	Cross-Cutting	Human rights / 15160	Developing countries, unspecified	CRS 2014001128 / General Support to Transparency International
Developing countries, unspecified	1,785,000	265,313	Disbursed	ODA	Grant	Cross-Cutting	Multisector education/training / 43081	Developing countries, unspecified	CRS 2014001145 / Grant for the administration af research to Danida Fellowship centre
Developing countries, unspecified	10,000,000	1,486,346	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001167 / Support for climate and energy actitities in developing countries UNEP and UNEP-Risø
Developing countries, unspecified	7,434,810	1,105,070	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2014001184 / Research projects/FFU incl. pilot projects from 2008. South and North driven from 2015
Developing countries, unspecified	16,196,780	2,407,402	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2014001185 / Research projects/FFU incl. pilot projects from 2008. South and North driven from 2013
Developing countries, unspecified	7,940,000	1,180,159	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Developing countries, unspecified	CRS 2014001186 / Low Carbon Transition Unit (LCTU)
Developing countries, unspecified	628,925	93,480	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Developing countries, unspecified	CRS 2014001233 / Joint Scandinavian evaluation of support to capacity development
Developing countries, unspecified	850,000	126,339	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001292 / Klimapuljen 2014 - Support to negotiation activitites
Developing countries, unspecified	12,500,000	1,857,933	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001332 / Rio+20 - CISU - Civil Society Activities in the area of Climate and Environment, contribution 2014-2016
Developing countries, unspecified	12,100,000	1,798,479	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001371ab / IUCN - Programme support 2015-2016
Developing countries, unspecified	400,000	59,454	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001371aa / IUCN - Programme support 2015-2016
Developing countries, unspecified	533,140	79,243	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001384 / Nationally Appropriate Mitigation Actions (NAMA) Facility
Developing countries, unspecified	9,000,000	1,337,712	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	Developing countries, unspecified	CRS 2015001010 / Vedvarende Energi - Rammebevilling 2015-2016
Developing countries, unspecified	61,500,000	9,141,030	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Developing countries, unspecified	CRS 2015001013 / DCA - Rammebevilling 2015 - 2016
Developing countries, unspecified	7,500,000	1,114,760	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	Developing countries, unspecified	CRS 2015001015 / Verdens Skove - Frame Agreement 2015-2016
Developing countries, unspecified	28,000,000	4,161,770	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Developing countries, unspecified	CRS 2015001016 / Save the Children - Frame Agreement 2015-2016
Developing countries, unspecified	7,500,000	1,114,760	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	Developing countries, unspecified	CRS 2015001019 / WWF - Frame Agreement 2015-2016

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 20XX-3 = 2015 [a]

Recipient country/ region/project/programme [b]	Total amount		Status [c, 3]	Funding source [d]	Financial instrument [e]	Type of support [e]	Sector [d, 7]	Recipient country/ region/project/programme [b]	Additional Information [e]
Project/programme/activity	Climate-specific [f, 2]		Committed / Disbursed	ODA / OOF / Other [g]	Grant / Concessional loan / Non-concessional loan / Equity / Other [g]	Mitigation / Adaptation / Cross-cutting [h] / Other [g]	Energy / Transport / Industry / Agriculture / Forestry / Water and sanitation / Cross-cutting / Other [g]	Recipient country or region	
	DKK	USD							
Developing countries, unspecified	60,500,000	8,992,395	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	Developing countries, unspecified	CRS 2015001025 / IBIS - Frame Agreement 2015-2016
Developing countries, unspecified	762,500	113,334	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001057 / Support to the 92 Group in the area of climate and environment 2015-2016
Developing countries, unspecified	1,500,000	222,952	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001064ab / 3GF2015
Developing countries, unspecified	1,257,205	186,864	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001064aa / 3GF2015
Developing countries, unspecified	3,750,000	557,380	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001091 / Support to World Resources Insitute (WRI) 2013-2017
Developing countries, unspecified	5,000,000	743,173	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001138 / Climate Envelope 2015: Support for CCAP (Centre for Clean Air Policy)
Developing countries, unspecified	359,405	53,420	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001149 / CSR Facility 2015: NEPcon
Developing countries, unspecified	212,135	31,531	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Developing countries, unspecified	CRS 2015001175aa / Evaluation of Vietnam: Transition from Aide to Trade
Developing countries, unspecified	500,000	74,317	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Developing countries, unspecified	CRS 2015001241 / 3ie
Egypt	210,280	31,255	Disbursed	ODA	Grant	Mitigation	Wind energy / 23240	Egypt	CRS 2007001582aa / Zafarana Wind Farm Project, Component III
Ethiopia	181,920	27,040	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Ethiopia	CRS 2012001420 / Horn of Africa - food security and resilience - programme management
Far East Asia, regional	750,000	111,476	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	Far East Asia, regional	CRS 2013001227 / CSR-facility: Let's do it right in Myanmar - supporting strong corporate social and environmental responsibility
Georgia	2,924,725	434,715	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Georgia	CRS 2015001245ac / Support to Energy Efficiency and Sustainable Energy in Georgia
Ghana	113,945	16,936	Disbursed	ODA	Grant	Cross-Cutting	Education facilities and training / 11120	Ghana	CRS 2012001203 / Establishment of Environmental Monitoring Laboratory at the University of Mines and Technology (UMaT) Project
Ghana	1,131,825	168,228	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Ghana	CRS 2012001384 / Toms Gruppen/Ibis/Source Trust-Creating Sustainable Cocoa Supply Chain
Honduras	550,000	81,749	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	Honduras	CRS 2013001203 / CSR-facility. Forest of the World. Creating shared value in the Honduran Forestry Sector
Indonesia	3,404,110	505,969	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Indonesia	CRS 2011001222 / Indonesia: Klimapuljen 2011/Climate Envelope 2011: support to Harapan-province
Indonesia	5,441,800	808,840	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001357 / Environment and climate
Indonesia	1,040	155	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Indonesia	CRS 2012001359 / Energy and Climate
Indonesia	10,414,680	1,547,982	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001386 / Natural Ressourcemanagement and Climate
Indonesia	2,333,425	346,828	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001387 / Advisors
Indonesia	609,015	90,521	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2013001134 / DBP Tansoputra Asia and Smoke Solution
Indonesia	306,120	45,500	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2013001352 / DBP Hyprowira Adhitama and Weel and Sandvig
Indonesia	369,870	54,975	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2014001199 / DBP Kaltimex Lestari Makmur and Syntes Engineering
Indonesia	225,410	33,504	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2015001215aa / Evaluation of Danida Energy and Environment Co-operation in South East Asia
Kenya	87,475	13,002	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2006001308 / Strategic Management Component
Kenya	625,110	92,913	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2006001311 / Programme Support Unit
Kenya	81,215	12,071	Disbursed	ODA	Grant	Mitigation	Environmental education/ training / 41081	Kenya	CRS 2009002004 / U-landskalender 2009: Under the Same Sky: Schools for Sustainable Development
Kenya	1,623,605	241,324	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002460ab / Component 1. Environmental Policies and Governance
Kenya	996,110	148,056	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002460ac / Component 1. Environmental Policies and Governance
Kenya	6,209,145	922,894	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002460aa / Component 1. Environmental Policies and Governance
Kenya	652,465	96,979	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002472ab / Component 2. Support to Arid Lands Resource Management
Kenya	8,839,660	1,313,880	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002472aa / Component 2. Support to Arid Lands Resource Management
Kenya	5,942,635	883,281	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002473 / Component 3. Civil Society and Private Sector Management of Natural Resources
Kenya	626,300	93,090	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Kenya	CRS 2009002474 / Programme management
Kenya	6,146,150	913,531	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Kenya	CRS 2010001565 / BSPSII/Component 2 - Competitiveness of Micro-, Small and Medium Sized Enterprises
Kenya	5,045,900	749,996	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Kenya	CRS 2010001566 / BSPSII/Component 1 - Business Enabling Environment
Kenya	12,036,080	1,788,978	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Kenya	CRS 2010001567 / BSPSII/Component 3 - Innovation and piloting Green Energy
Kenya	7,077,030	1,051,892	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	CRS 2012001326 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	9,319,390	1,385,184	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	CRS 2012001327 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	3,303,110	490,957	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	CRS 2012001328 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	246,140	36,585	Disbursed	ODA	Grant	Adaptation	Business support services and institutions / 25010	Kenya	CRS 2012001329 / Kenya - Climate Envelope 2012: continuation of bilateral climate programme re. energy efficiency
Kenya	92,865	13,803	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Kenya	CRS 2014001385 / Real-Time Evaluation of the Danida Country Programme for Kenya
Mali	1,111,100	165,148	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Mali	CRS 2009002134 / Projet de faisabilité des ressources de l'énergie renouvelables au Mali
Mali	2,035,555	302,554	Disbursed	ODA	Grant	Mitigation	Basic drinking water supply and basic sanitation / 14030	Mali	CRS 2009002330ac / Appui au BPO Eau
Mali	1,351,355	200,858	Disbursed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	Mali	CRS 2009002330ad / Appui au BPO Eau
Mali	7,571,770	1,125,427	Disbursed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	Mali	CRS 2009002330aa / Appui au BPO Eau
Mali	360,000	53,508	Disbursed	ODA	Grant	Mitigation	Energy generation, non-renewable sources – unspecified / 23310	Mali	CRS 2013001146 / Projet de faisabilité d'une centrale thermique à déchets à Bamako
Mali	8,426,385	1,252,453	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001256 / Développement et amélioration des infrastructures (composant 2)
Mali	9,924,775	1,475,165	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001257 / Renforcement des capacités et des compétences (composant 3)
Mali	49,730	7,392	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Mali	CRS 2013001258ab / Études, audits, formation, DFC, suivi et évaluation
Mali	56,420	8,386	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001258ac / Études, audits, formation, DFC, suivi et évaluation
Mali	209,325	31,113	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001258aa / Études, audits, formation, DFC, suivi et évaluation
Mali	6,810,120	1,012,220	Disbursed	ODA	Grant	Adaptation	Water supply and sanitation - large systems / 14020	Mali	CRS 2015001112 / Améliorer l'accés à l'eau et l'assainissement. Programme de transition 2015-2016 2/3
Mexico	38,310	5,694	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	CRS 2013001337ab / Climate Envelope 2013: Climate change mitigation and energy in Mexico
Mexico	14,904,750	2,215,362	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	CRS 2013001337aa / Climate Envelope 2013: Climate change mitigation and energy in Mexico
Middle East, regional	1,202,780	178,775	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Middle East, regional	CRS 2010001507 / MERAP - Middle East Regional Agri. Prog.
Mozambique	1,077,550	160,161	Disbursed	ODA	Grant	Cross-Cutting	Environmental research / 41082	Mozambique	CRS 2010001416ab / Komponent 1
Mozambique	15,259,800	2,268,135	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001416aa / Komponent 1
Mozambique	2,262,010	336,213	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001458 / Component 3
Mozambique	965,305	143,478	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001460 / Administration/review
Mozambique	2,879,065	427,929	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001461ab / Component 2-Municipalities
Mozambique	10,144,020	1,507,753	Disbursed	ODA	Grant	Cross-Cutting	Decentralisation and support to subnational government / 15112	Mozambique	CRS 2010001461aa / Component 2-Municipalities
Mozambique	1,379,670	205,067	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001325ab / Climate Change and Environmental Sector Programme Support Phase III
Mozambique	2,000,000	297,269	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001326ab / Climate Change and Environmental Sector Programme Support Phase III
Mozambique	1,507,690	224,095	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001326aa / Climate Change and Environmental Sector Programme Support Phase III
Myanmar	875,000	130,055	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Myanmar	CRS 2015001078 / (GRET) Myanmar Farmers Innovating for Rural development and Environmental restoration, MyFIRE
Nepal	7,750,000	1,151,918	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies / 23210	Nepal	CRS 2012001347 / NRREP: Central Renewable Energy Fund (CREF) Component
Nepal	5,150,000	765,468	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies / 23210	Nepal	CRS 2012001360 / NRREP: Technical Support Component
Nepal	1,000,000	148,635	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	Nepal	CRS 2012001361 / NRREP: Productive Energy Component
Nepal	205,945	30,611	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	Nepal	CRS 2012001363 / NRREP: Reviews, Audit and Studies
Nepal	426,820	63,440	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	CRS 2013001129 / DBP Nepal Fertliser Industries and Biosa ApS
Nepal	705,405	104,848	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	CRS 2014001100 / Mirage Printing Solution P. Ltd and Nilpeter A/S
Niger	244,770	36,381	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Niger	CRS 2008001524ab / Rural development Support in Diffa and Zinder regions
Niger	781,520	116,161	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	Niger	CRS 2008001524aa / Rural development Support in Diffa and Zinder regions
Niger	19,777,085	2,939,560	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001157 / Composante 1/Approvisonnement en Eau Potable et Gestion Intégrée de Ressources en Eau
Niger	7,927,115	1,178,244	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001158 / Composante 2/ Promotion de l'Hygiène et de l'Assainissement de Base
Niger	486,205	72,267	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001160 / Conseiller Danida
Niger	2,200,385	327,053	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001171 / Assistance technique par Bureaux d'études
Niger	123,215	18,314	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001172 / Revues, Audits, études et formulation de la 3ème phase du programme
Niger	21,670	3,221	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	CRS 2014001138ab / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Niger	5,283,770	785,351	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	CRS 2014001138ac / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Niger	172,395	25,624	Disbursed	ODA	Grant	Cross-Cutting	Agricultural policy and administrative management / 31110	Niger	CRS 2014001138aa / Programme de Promotion de l'Emploi et de la Croissance Economique dans l'Agriculture au Niger
Philippines	482,420	71,704	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Philippines	CRS 2004001292 / Ilocos Norte, Bangui Bay Wind Farm Project, Phase II
Serbia	297,165	44,169	Disbursed	ODA	Grant	Adaptation	Agricultural services / 31191	Serbia	CRS 2010001509 / Private Sector Programme in Serbia, capacity building

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 20XX-3 = 2015 [a]

Recipient country/ region/project/programme [b]	Total amount		Status [c,3]	Funding source [4]	Financial instrument [5]	Type of support [6]	Sector [d,7]	Recipient country/ region/project/programme [b]	Additional Information [e]
Project/programme/activity	Climate-specific [f,2]		Committed Disbursed	ODA OOF Other [g]	Grant Concessional loan Non-concessional loan Equity Other [g]	Mitigation Adaptation Cross-cutting [h] Other [g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [g]	Recipient country or region	
	DKK	USD							
Serbia	4,266,540	634,156	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001510 / Private Sector Programme in Serbia, Financing facility
Serbia	1,222,505	181,707	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001511 / Administration incl. audit and review
Serbia	359,300	53,404	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001512 / Adviser
Somalia	6,000,000	891,808	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Somalia	CRS 2012001418aa / Horn of Africa - comp. 2: FAO and NGO consortium: support to resilience in Somalia
South Africa	12,394,240	1,842,213	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	South Africa	CRS 2012001288 / Climate Envelope 2012: South Africa - low carbon transition in the energy efficiency sector
South Africa	402,975	59,896	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	South Africa	CRS 2013001141 / Private/Public Partnership Project in the Water Sector
South of Sahara, regional	989,275	147,041	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	South of Sahara, regional	CRS 2013001212 / CSR-Facility: Establishment and implementation of international standards for sustainable and traceable cocoa
South of Sahara, regional	202,230	30,058	Disbursed	ODA	Grant	Mitigation	Trade facilitation / 33120	South of Sahara, regional	CRS 2013001326 / Organic Denmark - project identification for the project ECOMEA 'Enhancing the capacity of the organic movements in East Africa'
Tanzania	12,120	1,801	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001286 / EMA-ISP Component 1
Tanzania	357,925	53,200	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001287ab / UDEM - Component 2
Tanzania	6,499,655	966,074	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001287aa / UDEM - Component 2
Tanzania	50,390	7,490	Disbursed	ODA	Grant	Mitigation	Forestry policy and administrative management / 31210	Tanzania	CRS 2007001291 / PFM - Component 3
Tanzania	589,250	87,583	Disbursed	ODA	Grant	Mitigation	Water transport / 21040	Tanzania	CRS 2013001193 / Renewal of Ferry Fleet on Lake Victoria, Lake Tanganyika and Lake Nyasa: Support to Detailed Design and Tendering
Tanzania	1,292,665	192,135	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Tanzania	CRS 2013001365aa / BSPS IV - Component 1: Agricultural Markets Development
Turkey	706,950	105,077	Disbursed	ODA	Grant	Mitigation	Urban development and management / 43030	Turkey	CRS 2015001163 / Tyrkiet. Danish-Turkish Strategic Sector Cooperation (energy, environment, research)
Uganda	45,030	6,693	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2008001259 / B2B Konserve Consult Ltd and Energimidt A/S
Uganda	107,950	16,045	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2009002060 / Restoration of Agricultural Livelihood in Northern Uganda
Uganda	848,955	126,184	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2009002325 / Agribusiness Development Initiative
Uganda	8,185	1,217	Disbursed	ODA	Grant	Cross-Cutting	Culture and recreation / 16061	Uganda	CRS 2010001581 / Youth Cultures Project
Uganda	104,600	15,547	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2011001556 / Firmenich and Uvan
Uganda	387,100	57,536	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2012001213 / International Woodland Company and Continental Forests Ltd.
Uganda	1,514,270	225,073	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	Uganda	CRS 2012001411 / An integrated approach to natural resources management in Northern Uganda
Uganda	17,424,630	2,589,904	Disbursed	ODA	Grant	Cross-Cutting	Water supply - large systems / 14021	Uganda	CRS 2013001184 / Sector Budget Support for Rural Water Supply
Uganda	8,300,000	1,233,667	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Uganda	CRS 2013001325 / Climate Envelope 2013: Pro-poor REDD (IUCN), ph. 2
Uganda	27,501,840	4,087,726	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001353 / Joint Partnership Fund-basket
Uganda	4,649,830	691,126	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001354 / Long term technical assistance
Uganda	150,040	22,301	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001355 / Administration/review
Uganda	16,967,130	2,521,903	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2014001147 / Agribusiness Initiative - aBi Trust & aBi Finance
Uganda	5,644,520	838,971	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149ab / Recovery and Development in Northern Uganda
Uganda	1,926,115	286,287	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149ac / Recovery and Development in Northern Uganda
Uganda	3,005,895	446,780	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149aa / Recovery and Development in Northern Uganda
Uganda	348,840	51,850	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Uganda	CRS 2014001151 / Reviews and Studies
Ukraine	3,697,115	549,519	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	Ukraine	CRS 2014001401ab / Renewable Energy and Energy Efficiency Programme 2014-17.
Ukraine	5,250,000	780,332	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	Ukraine	CRS 2014001401aa / Renewable Energy and Energy Efficiency Programme 2014-17.
Viet Nam	2,535,195	376,818	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	Viet Nam	CRS 2006001132 / Technical assistance
Viet Nam	116,500	17,316	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Viet Nam	CRS 2006001133 / Programme management
Viet Nam	223,855	33,273	Disbursed	ODA	Grant	Mitigation	Agricultural policy and administrative management / 31110	Viet Nam	CRS 2007001119 / Central component
Viet Nam	4,131,920	614,146	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2008001365 / Support to National Target Programme on Climate Change
Viet Nam	518,830	77,116	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Viet Nam	CRS 2008001366 / Support to National Energy Efficiency Programme
Viet Nam	891,240	132,469	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2008001367 / Programme management
Viet Nam	507,350	75,410	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2011001479ab / Renewable Energy Water Supply for the Mekong Delta
Viet Nam	129,740	19,284	Disbursed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	Viet Nam	CRS 2011001479aa / Renewable Energy Water Supply for the Mekong Delta
Viet Nam	2,317,540	344,467	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Viet Nam	CRS 2012001287ab / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	925,460	137,555	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2012001287ac / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	1,457,450	216,628	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2012001287aa / Climate Envelope 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	31,790	4,725	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Viet Nam	CRS 2012001486 / Danish support to Reduction of Non-Revenue Water in Vietnam
Viet Nam	442,595	65,785	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2013001198 / DBP: University of Can Tho and Oxy Guard International A/S
Viet Nam	1,191,460	177,092	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Viet Nam	CRS 2014001106ab / Evaluation of the Danish Climate Change Funding to Developing Countries
Viet Nam	922,690	137,144	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2014001245 / DBP Thuy Son JSC and C.F. Nielsen A/S
Viet Nam	98,230	14,600	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Viet Nam	CRS 2015001175ab / Evaluation of Vietnam: Transition from Aide to Trade
Zambia	44,450	6,607	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Zambia	CRS 2008001481 / Program reviews
Zambia	316,035	46,974	Disbursed	ODA	Grant	Cross-Cutting	Water supply and sanitation - large systems / 14020	Zambia	CRS 2011001391 / Rural Water Supply and Sanitation

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

Exchange rate 2015: USD 1 = DKK 6.727907, Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

Table 7(b)									
Provision of public financial support: contribution through bilateral, regional and other channels in 20XX-3 = 2016 [a]									
Recipient country/ region/project/programme [b]	Total amount		Status [c,3]	Funding source [4]	Financial instrument [5]	Type of support [6]	Sector [d,7]	Recipient country/ region/project/programme [b]	Additional Information [e]
Project/programme/activity	Climate-specific [f,2]		Committed Disbursed	ODA OOF Other [g]	Grant Concessional loan Non-concessional loan Equity Other [g]	Mitigation Adaptation Cross-cutting [h] Other [g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [g]	Recipient country or region	
	DKK	USD							
Afghanistan	19,500,000	2,896,735	Disbursed	ODA	Grant	Mitigation	Public sector policy and administrative management / 15110	Afghanistan	CRS 2013001246 / Støtte til National Solidarity Programme (NSP)
Afghanistan	9,000,000	1,336,954	Disbursed	ODA	Grant	Cross-Cutting	Material relief assistance and services / 72010	Afghanistan	CRS 2013001248 / Støtte til DACAAR
Afghanistan	50,000	7,428	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300ab / Landeprogram Afghanistan - TP 3: Vækst og Beskæftigelse
Afghanistan	37,292,531	5,539,824	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Afghanistan	CRS 2014001300aa / Landeprogram Afghanistan - TP 3: Vækst og Beskæftigelse
Africa, regional	600,000	89,130	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Africa, regional	CRS 2011001498ab / Støtte til forvaltningen af vand i SADC/Zambezi regionen
Africa, regional	6,399,123	950,593	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Africa, regional	CRS 2011001498aa / Støtte til forvaltningen af vand i SADC/Zambezi regionen
Africa, regional	179,998	26,739	Disbursed	ODA	Grant	Cross-Cutting	Agricultural education/training / 31181	Africa, regional	CRS 2011001526 / Afrikakommissionen. Universitets-, forsknings- og agribusiness initiativet URABI, (FARA)
Asia, regional	500,000	74,275	Disbursed	ODA	Grant	Cross-Cutting	Security system management and reform / 15210	Asia, regional	CRS 2014001161 / (tom)
Asia, regional	2,500,000	371,376	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Asia, regional	CRS 2015001246 / Climate Envelope 2015: IUCN - Mangroves for the Future Phase 3 (2015-18)
Bangladesh	2,842,616	422,272	Disbursed	ODA	Grant	Adaptation	Basic drinking water supply and basic sanitation / 14030	Bangladesh	CRS 2010001680 / (tom)
Bangladesh	353,439	52,503	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Bangladesh	CRS 2010001681 / (tom)
Bangladesh	3,676,993	546,219	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221ac / Climate Change Adaptation and Mittigation Programme
Bangladesh	1,017,160	151,100	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bangladesh	CRS 2014001221ad / Climate Change Adaptation and Mittigation Programme
Bangladesh	10,045,841	1,492,315	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Bangladesh	CRS 2015001187 / Climate Change Adaptation Project Phase II
Bolivia	11,286	1,676	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2010001398 / Øget værditilvækst især i små og mellemstore virksomheder, med mest fokus på forarbejdning af landbrugsvarer
Bolivia	129,650	19,260	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2010001402 / Administration, rådgivning og control
Bolivia	1,662,061	246,900	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001339ab / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding
Bolivia	1,681,751	249,825	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001339aa / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding
Bolivia	17,800,527	2,644,277	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ab / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding
Bolivia	1,536,850	228,300	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ac / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding
Bolivia	8,872,053	1,317,948	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340ad / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding
Bolivia	2,943,343	437,235	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Bolivia	CRS 2013001340aa / Landeprogram Bolivia - del III: Fremme af bæredygtig naturressourceforvaltning & klimaænding
Bolivia	9,654,563	1,434,190	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378ab / Landeprogram Bolivia - del I: Fremme af inklusiv og bæredygtig økonomisk vækst
Bolivia	779,120	115,739	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378ac / Landeprogram Bolivia - del I: Fremme af inklusiv og bæredygtig økonomisk vækst
Bolivia	16,198,995	2,406,369	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378ad / Landeprogram Bolivia - del I: Fremme af inklusiv og bæredygtig økonomisk vækst
Bolivia	1,491,542	221,569	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Bolivia	CRS 2013001378aa / Landeprogram Bolivia - del I: Fremme af inklusiv og bæredygtig økonomisk vækst
Bolivia	612,104	90,928	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Bolivia	CRS 2014001175 / Research and Outreach activities on Equitable and Sustainable Development, 2014-2017- Core Funding for Fundación INESAD
Bolivia	195,720	29,074	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Bolivia	CRS 2016001175 / Evaluation of the Danish engagement in Bolivia 1994-2016
Brazil	1,400,000	207,971	Disbursed	ODA	Equity	Mitigation	Industrial policy and administrative management / 32110	Brazil	CRS 2016320078 / (tom)
Burkina Faso	3,627,030	538,797	Disbursed	ODA	Grant	Mitigation	Water sector policy and administrative management / 14010	Burkina Faso	CRS 2009002442 / Component 1 Support to Integrated Water Resources Management PAGIRE 2)
Burkina Faso	2,751,445	408,729	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Burkina Faso	CRS 2012001507ab / Improved access to consultancy advice and financing for private enterprises
Burkina Faso	1,996,049	296,514	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Burkina Faso	CRS 2012001507aa / Improved access to consultancy advice and financing for private enterprises
Burkina Faso	34,531,839	5,129,722	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Burkina Faso	CRS 2012001508 / Improved framework conditions for small and medium-sized agricultural enterprises and extension of infrastructure
Burkina Faso	385,832	57,316	Disbursed	ODA	Grant	Cross-Cutting	Forestry research / 31282	Burkina Faso	CRS 2015001132 / INERA - Forbedring af production af Sheabutter
Burkina Faso	35,000,000	5,199,267	Disbursed	ODA	Grant	Cross-Cutting	General budget support-related aid / 51010	Burkina Faso	CRS 2015001299 / General Budget Support Burkina Faso
Burkina Faso	23,597,779	3,505,462	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Burkina Faso	CRS 2015001306 / Eau et Assainissement 2016-2020
China (People's Republic of)	13,760	2,044	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	China (People's Republic of)	CRS 2008001543 / Program for vedvarende energi: komponent 1 - institutionel udvikling
China (People's Republic of)	29,072	4,319	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	China (People's Republic of)	CRS 2008001545 / Program for vedvarende energi: programadministration
China (People's Republic of)	333,985	49,614	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	China (People's Republic of)	CRS 2016001142 / Strategic sector cooperation Water and Environment, China
China (People's Republic of)	12,596,386	1,871,199	Disbursed	ODA	Equity	Mitigation	Industrial policy and administrative management / 32110	China (People's Republic of)	CRS 2016320015 / (tom)
China (People's Republic of)	13,453,614	1,998,541	Disbursed	ODA	Equity	Mitigation	Solar energy / 23230	China (People's Republic of)	CRS 2016320080 / (tom)
China (People's Republic of)	5,283,096	784,806	Disbursed	ODA	Equity	Mitigation	Wind energy / 23240	China (People's Republic of)	CRS 2016320081 / (tom)
Developing countries, unspecified	13,719	2,038	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2009002362 / Bæredygtig Naturressourceforvaltning
Developing countries, unspecified	4,395,058	652,888	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2012001277 / Klimapuljen 2012: Agrhymet - klimatilpasning i vestlige Afrika
Developing countries, unspecified	5,237,534	778,038	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2012001278 / Forskningsprojekter/FFU inkl. pilotprojekter fra 2008. Syd- og Norddrevne fra 2013
Developing countries, unspecified	2,483,434	368,915	Disbursed	ODA	Grant	Cross-Cutting	Higher education / 11420	Developing countries, unspecified	CRS 2012001404 / Danske Universiteters platforme
Developing countries, unspecified	650,000	96,558	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	Developing countries, unspecified	CRS 2013001278 / CSR-puljen: DIEH en styrket dansk indsats inden for etisk handel
Developing countries, unspecified	8,500,000	1,262,679	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Developing countries, unspecified	CRS 2013001290 / Støtte til Global Water Partnership (GWP) 2013-18 (5 år)
Developing countries, unspecified	4,300,000	638,767	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2013001325 / Klimapuljen 2013: Pro-poor REDD (IUCN), fase 2
Developing countries, unspecified	6,833	1,015	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Developing countries, unspecified	CRS 2014001083 / Rammeaftale med Caritas 2014
Developing countries, unspecified	79,721	11,843	Disbursed	ODA	Grant	Cross-Cutting	Relief co-ordination; protection and support services / 72050	Developing countries, unspecified	CRS 2014001096 / Evaluation of the Danish Humantarian Strategy 2010-2015
Developing countries, unspecified	592,340	87,992	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001106 / Evaluation of the Danish Climate Change Funding to Developing Countries
Developing countries, unspecified	1,805,000	268,134	Disbursed	ODA	Grant	Cross-Cutting	Multisector education/training / 43081	Developing countries, unspecified	CRS 2014001145 / Driftsbevilling til administration af forskningen til Danida Fellowship Centre
Developing countries, unspecified	15,000,000	2,228,257	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001167 / Støtte til klima- og energiindsatser i udviklingslandene via FNs miljøprogram (UNEP) og Risø-centeret
Developing countries, unspecified	285,478	42,408	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2014001184 / Forskningsprojekter/FFU inkl. pilotprojekter fra 2008. Syd- og Norddrevne fra 2013
Developing countries, unspecified	2,518,643	374,146	Disbursed	ODA	Grant	Cross-Cutting	Research/scientific institutions / 43082	Developing countries, unspecified	CRS 2014001185 / Forskningsprojekter/FFU inkl. pilotprojekter fra 2008. Syd- og Norddrevne fra 2013
Developing countries, unspecified	3,440,000	511,014	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Developing countries, unspecified	CRS 2014001186 / Low Carbon Transition Unit (LCTU)
Developing countries, unspecified	10,901	1,619	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Developing countries, unspecified	CRS 2014001233 / Joint Scandinavian evaluation of support to capacity development
Developing countries, unspecified	5,000,000	742,752	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001234 / IIED 2014-2019
Developing countries, unspecified	12,500,000	1,856,881	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001332 / Rio+20 - CISU - Civil Society Activities in the area of Climate and Environment, contribution 2014-2016
Developing countries, unspecified	12,500,000	1,856,881	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001371 / Programstøtte til den Internationale Naturbevaringssammenslutning IUCN
Developing countries, unspecified	359,483	53,401	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2014001384 / Nationally Appropriate Mitigation Actions (NAMA) Facility
Developing countries, unspecified	963,894	143,187	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001064 / 3GF2015
Developing countries, unspecified	3,750,000	557,064	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001091 / Støtte til World Resources Institute (WRI) 2013-2017
Developing countries, unspecified	4,127,323	613,116	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001138 / Klimapuljen 2015: Støtte til CCAP (Centre for Clean Air Policy)
Developing countries, unspecified	718,810	106,780	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001149 / CSR-pulje 2015: NEPcon. Ansvarligt indkøb af soya, kvæg og palmeolie: Reducering af sociale og miljømæssige risici.
Developing countries, unspecified	509,455	75,680	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001215 / Evaluation of Danida Energy and Environment Co-operation in South East Asia
Developing countries, unspecified	4,500,000	668,477	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2015001250 / Low Carbon Transition Unit (LCTU)
Developing countries, unspecified	7,500,000	1,114,129	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Developing countries, unspecified	CRS 2016001031 / Vedvarende Energi - Rammebevilling 2015-2017
Developing countries, unspecified	11,800,000	1,752,896	Disbursed	ODA	Grant	Mitigation	Forestry policy and administrative management / 31210	Developing countries, unspecified	CRS 2016001032 / Verdens Skove - Rammebevilling 2015-2017
Developing countries, unspecified	5,550,000	824,455	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2016001033 / WWF - Rammebevilling 2015-2017
Developing countries, unspecified	31,500,000	4,679,340	Disbursed	ODA	Grant	Adaptation	Material relief assistance and services / 72010	Developing countries, unspecified	CRS 2016001043 / Folkekirkens Nødhjælp humanitær partnerskabsaftale 2016
Developing countries, unspecified	1,100,000	163,406	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2016001080 / Support to the 92 Group in the area of climate and environment 2015-2017
Developing countries, unspecified	350,000	51,993	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2016001084ab / 3GF 2016
Developing countries, unspecified	3,200,615	475,453	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2016001084aa / 3GF 2016

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 20XX-3 = 2016 [a]

Recipient country/ region/project/programme [b]	Total amount		Status [c,3]	Funding source [d]	Financial instrument [5]	Type of support [e]	Sector [d,7]	Recipient country/ region/project/programme [b]	Additional Information [e]
Project/programme/activity	Climate-specific [f,2]		Committed Disbursed	ODA OOF Other [g]	Grant Concessional loan Non-concessional loan Equity Other [g]	Mitigation Adaptation Cross-cutting [h] Other [g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [g]	Recipient country or region	
	DKK	USD							
Developing countries, unspecified	7,000,000	1,039,853	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2016001111 / Klimapuljen 2016: Forlængelse af Low Carbon Transition Unit (LCTU) - Danish Energy Agency Energy Partnership (DEA EP)
Developing countries, unspecified	5,000,000	742,752	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Developing countries, unspecified	CRS 2016001144 / IFU Development Program
Developing countries, unspecified	4,800,000	713,042	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Developing countries, unspecified	CRS 2016001145 / Dansk støtte til NDC-partnerskab
Developing countries, unspecified	29,550,000	4,389,667	Disbursed	ODA	Grant	Adaptation	Sectors not specified / 99810	Developing countries, unspecified	CRS 2016001021 / Røde Kors - Rammebevilling 2015-2017
Developing countries, unspecified	19,200,000	2,852,169	Disbursed	ODA	Grant	Adaptation	Multisector aid for basic social services / 16050	Developing countries, unspecified	CRS 2016001018 / CARE - Rammebevilling 2015-2017
Developing countries, unspecified	10,700,000	1,589,490	Disbursed	ODA	Grant	Adaptation	Multisector aid for basic social services / 16050	Developing countries, unspecified	CRS 2016001019 / Caritas - Rammebevilling 2015-2017
Egypt	125,726	18,677	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Egypt	CRS 2007001582 / Zafarana vindmølleprojekt, fase 3
Ethiopia	430,552	63,959	Disbursed	ODA	Grant	Mitigation	Wind energy / 23240	Ethiopia	CRS 2016001197aa / Accelerating Wind Power Generation in Ethiopia (2016-2019)
Far East Asia, regional	750,000	111,413	Disbursed	ODA	Grant	Mitigation	Democratic participation and civil society / 15150	Far East Asia, regional	CRS 2013001227 / CSR-puljen: Lad os gøre det rigtigt i Myanmar - Støtte til fremme af virksomheders samfundsansvar
Georgia	2,925,000	434,510	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Georgia	CRS 2015001245ab / Support to Energy Efficiency and Sustainable Energy in Georgia.
Georgia	2,377,905	353,239	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Georgia	CRS 2015001245aa / Support to Energy Efficiency and Sustainable Energy in Georgia.
Ghana	7,930,010	1,178,007	Disbursed	ODA	Grant	Cross-Cutting	Education facilities and training / 11120	Ghana	CRS 2012001203ab / Establishment of Environmental Monitoring Laboratory at the University of Mines and Technology (UMaT) Project
Ghana	73,770	10,959	Disbursed	ODA	Grant	Cross-Cutting	Education facilities and training / 11120	Ghana	CRS 2012001203aa / Establishment of Environmental Monitoring Laboratory at the University of Mines and Technology (UMaT) Project
Ghana	119,751	17,789	Disbursed	ODA	Grant	Adaptation	Agricultural development / 31120	Ghana	CRS 2012001384 / Toms Gruppen/Ibis/Source Trust-Creating Sustainable Cocoa Supply Chain
Honduras	350,000	51,993	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	Honduras	CRS 2013001203 / CSR-puljen. Verdens Skove. Skabelse af fælles værdier i den honduranske skovsektor
India	1,170,680	173,905	Disbursed	ODA	Equity	Mitigation	Sanitation - large systems / 14022	India	CRS 2016320082 / (tom)
Indonesia	190,728	28,333	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	Indonesia	CRS 2010001615 / Bæredygtig forvaltning af Mbeliling skov på Flores, Indonesien
Indonesia	938,071	139,351	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Indonesia	CRS 2011001222 / Indonesia: Klimapuljen 2011/Climate Envelope 2011: support to Harapan-province
Indonesia	498,747	74,089	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001357ab / Miljø & Klima
Indonesia	12,017,560	1,785,214	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001357aa / Miljø & Klima
Indonesia	17,002,652	2,525,752	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001386 / Naturressourceforvaltning og Klima
Indonesia	782,905	116,301	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001387ab / Rådgiver
Indonesia	1,480,149	219,877	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Indonesia	CRS 2012001387aa / Rådgiver
Indonesia	80,197	11,913	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2012001442 / DBP Pandega Desain Weharima og AGS
Indonesia	531,174	78,906	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2013001134 / DBP Tansoputra Asia og Smoke Solution
Indonesia	183,040	27,191	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2013001352 / DBP Hyprowira Adhitama og Weel and Sandvig
Indonesia	353,673	52,538	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Indonesia	CRS 2014001199 / DBP Kaltimex Lestari Makmur og Syntes Engineering
Indonesia	1,340,404	199,118	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Indonesia	CRS 2015001286 / Danish-Indonesian Strategic Sector Cooperation on clean energy, renewable energy and energy efficiency
Kenya	1,978,943	293,973	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002460ab / Komponent 1: Fattigdomsorienteret miljøpolitik og forvaltning
Kenya	1,011,416	150,246	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002460aa / Komponent 1: Fattigdomsorienteret miljøpolitik og forvaltning
Kenya	484,028	71,903	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002472ab / Komponent 2. Støtte til fattigdomsbekæmpelse i tørkeområder
Kenya	674,872	100,253	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002472aa / Komponent 2. Støtte til fattigdomsbekæmpelse i tørkeområder
Kenya	8,547,404	1,269,721	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Kenya	CRS 2009002473 / Komponent 3. Fattigdomsbekæmpelse gennem civilsamfund/den private sektor
Kenya	299,857	44,544	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Kenya	CRS 2009002474 / Programstyring og monitering
Kenya	2,797,004	415,496	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Kenya	CRS 2010001566 / Støtte til forbedret erhvervsklima
Kenya	3,897,840	579,026	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Kenya	CRS 2010001567 / Innovation og pilot-aktiviteter udvikling af grøn energi
Kenya	3,842,597	570,820	Disbursed	ODA	Grant	Adaptation	Environmental policy and administrative management / 41010	Kenya	CRS 2012001327 / Kenya - Klimapuljen 2012: videreførelse af bilateralt klimaprogram vedr. energieffektivitet
Kenya	34,523	5,128	Disbursed	ODA	Grant	Cross-Cutting	Sectors not specified / 99810	Kenya	CRS 2014001385 / Real-Time Evaluation of the Danida Country Programme for Kenya
Kenya	2,037,300	302,642	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	CRS 2015001217ab / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	11,436,269	1,698,863	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	CRS 2015001217ac / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	16,271,208	2,417,096	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	CRS 2015001217aa / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	6,917,920	1,027,660	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	CRS 2015001218ab / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	6,534,249	970,666	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Kenya	CRS 2015001218aa / Thematic Programme Green Growth & Employment - Kenya CP 2016-2020
Kenya	82,711	12,287	Disbursed	ODA	Grant	Mitigation	Industrial development / 32120	Kenya	CRS 2016001141 / Kenyan-Danish SSC on Green Growth in the manufacturing Sector
Kenya	249,032	36,994	Disbursed	ODA	Equity	Mitigation	Wind energy / 23240	Kenya	CRS 2016320083 / (tom)
Malaysia	2,800,056	415,950	Disbursed	ODA	Equity	Mitigation	Energy policy and administrative management / 23110	Malaysia	CRS 2016320084 / (tom)
Mali	15,765,960	2,342,041	Disbursed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	Mali	CRS 2009002330ab / Støtte til det nationale sektorprogram for vand og sanitet i Mali - vandkomponent
Mali	22,394,304	3,326,685	Disbursed	ODA	Grant	Mitigation	Water supply and sanitation - large systems / 14020	Mali	CRS 2009002330aa / Støtte til det nationale sektorprogram for vand og sanitet i Mali - vandkomponent
Mali	10,949,327	1,626,528	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001256 / Udvikling og forbedring af infrastruktur (komponent 2)
Mali	5,007,383	743,849	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001257 / Styrkelse af kapacitet og kompetencer (komponent 3)
Mali	37,678	5,597	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001258ab / Studier, revision, uddannelse, DFC, tilsyn og evaluering
Mali	866,836	128,769	Disbursed	ODA	Grant	Cross-Cutting	Business support services and institutions / 25010	Mali	CRS 2013001258aa / Studier, revision, uddannelse, DFC, tilsyn og evaluering
Mali	30,799,217	4,575,239	Disbursed	ODA	Grant	Adaptation	Water supply and sanitation - large systems / 14020	Mali	CRS 2015001112 / Improving access to water and sanitation. Transitionsprogramme Mali 2015-2016 2/3
Mexico	65,924	9,793	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	CRS 2013001337ab / Klimapuljen 2013: Imødegåelse af klimaforandringer samt energi i Mexico
Mexico	11,076,239	1,645,381	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Mexico	CRS 2013001337aa / Klimapuljen 2013: Imødegåelse af klimaforandringer samt energi i Mexico
Middle East, regional	175,021	26,000	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Middle East, regional	CRS 2010001507 / Regionalt landbrugsprogram i Mellemøsten
Mozambique	869	129	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001458 / (tom)
Mozambique	404,896	60,148	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001460 / (tom)
Mozambique	481,065	71,462	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2010001461 / (tom)
Mozambique	2,630,240	390,723	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001325ab / Klima og Miljøsektorprogram Fase III
Mozambique	6,973,555	1,035,925	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001325aa / Klima og Miljøsektorprogram Fase III
Mozambique	658,700	97,850	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001326ab / Klima og Miljøsektorprogram Fase III
Mozambique	6,841,300	1,016,278	Disbursed	ODA	Grant	Cross-Cutting	Environmental policy and administrative management / 41010	Mozambique	CRS 2014001326aa / Klima og Miljøsektorprogram Fase III
Myanmar	95,000	14,112	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Myanmar	CRS 2013001078 / (GRET) Myanmar Farmers Innovating for Rural development and Environmental restoration, MyFIRE
Myanmar	365,685	54,323	Disbursed	ODA	Grant	Adaptation	Fishery development / 31320	Myanmar	CRS 2016001157ab / Real-Time Evaluation of Sustainable Coastal Fisheries, Myanmar
Myanmar	1,599,875	237,662	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Myanmar	CRS 2016001190ab / Country Programme 2016-2020. ISEG Thematic Programme: Inclusive and Sustainable Economic Growth
Myanmar	7,564	1,124	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Myanmar	CRS 2016001190ac / Country Programme 2016-2020. ISEG Thematic Programme: Inclusive and Sustainable Economic Growth
Nepal	2,000,000	297,101	Disbursed	ODA	Grant	Cross-Cutting	Energy generation, renewable sources – multiple technologies / 23210	Nepal	CRS 2012001347 / NRREP: Centrale Fond for Vedvarende Energi (CREF) komponent
Nepal	567,011	84,230	Disbursed	ODA	Grant	Cross-Cutting	Energy policy and administrative management / 23110	Nepal	CRS 2012001363 / NRREP: Reviews, revision and studier
Nepal	313,184	46,524	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	CRS 2013001129 / DBP Nepal Fertliser Industries og Biosa ApS
Nepal	447,794	66,520	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Nepal	CRS 2014001100 / DBP Implemetation Phase between Nilpeter A/S and Mirage Printing Solution P. Ltd.
Niger	9,520,509	1,414,276	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001157 / Vandprogrammet i Niger (PASEHA2)/ Komponent 1
Niger	4,055,506	602,447	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001158 / Vandprogrammet i Niger (PASEHA 2)/ Komponent 2
Niger	469,468	69,740	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001160 / Rådgiver i vand og miljøministeriet
Niger	2,399,525	356,451	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001171 / Teknisk assistance af konsulentfirma
Niger	748,995	111,264	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Niger	CRS 2012001172 / Reviews, revision, studier og formulering af 3. programfase.
Niger	7,000,000	1,039,853	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	CRS 2014001138ab / Landbrugsprogrammet
Niger	86,746	12,886	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Niger	CRS 2014001138aa / Landbrugsprogrammet
Philippines	99,995	14,854	Disbursed	ODA	Grant	Mitigation	Sectors not specified / 99810	Philippines	CRS 2004001292 / Ilocos Norte, Bangui Bay vindmølle-projekt, fase II
Serbia	426,157	63,306	Disbursed	ODA	Grant	Adaptation	Agricultural services / 31191	Serbia	CRS 2010001509 / Privat sektor program i Serbien. kapacitetsopbygning
Serbia	1,249,339	185,590	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001510 / Privat sektor program i Serbien, finansieringsfacilitet
Serbia	573,786	85,236	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001511 / Administration inkl. revision og review
Serbia	450,285	66,890	Disbursed	ODA	Grant	Cross-Cutting	Agricultural services / 31191	Serbia	CRS 2010001512 / Rådgiverbistand
South Africa	4,565,169	678,158	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	South Africa	CRS 2012001288 / Klimapuljen 2012: Sydafrika - low carbon transition in the energy efficiency sector
South Africa	459,665	68,283	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	South Africa	CRS 2013001141 / (tom)

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 20XX-3 = 2016 [a]

Recipient country/ region/project/programme [b]	Total amount		Status [c, 3]	Funding source [4]	Financial instrument [5]	Type of support [6]	Sector [d, 7]	Recipient country/ region/project/programme [b]	Additional Information [e]
Project/programme/activity	Climate-specific [f, 2]		Committed Disbursed	ODA OOF Other [g]	Grant Concessional loan Non-concessional loan Equity Other [g]	Mitigation Adaptation Cross-cutting [h] Other [g]	Energy Transport Industry Agriculture Forestry Water and sanitation Cross-cutting Other [g]	Recipient country or region	
	DKK	USD							
South Africa	554,062	82,306	Disbursed	ODA	Grant	Adaptation	Water sector policy and administrative management / 14010	South Africa	CRS 2016001102 / South African - Danish Strategic Sector Cooperation on Water
South of Sahara, regional	225,541	33,504	Disbursed	ODA	Grant	Cross-Cutting	Democratic participation and civil society / 15150	South of Sahara, regional	CRS 2013001212 / CSR-puljen: Udvikling og implementering af internationale standarder for bæredygtighed og sporbarhed af kakao
Tanzania	65,420	9,718	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Tanzania	CRS 2007001286 / Implementering of Environmental Act
Tanzania	4,637,570	688,913	Disbursed	ODA	Grant	Mitigation	Business support services and institutions / 25010	Tanzania	CRS 2013001365 / Agricultural Markets Development
Turkey	552,418	82,062	Disbursed	ODA	Grant	Mitigation	Urban development and management / 43030	Turkey	CRS 2015001163 / Danish-Turkish Strategic Sector Cooperation (energy, environment, research)
Uganda	763	113	Disbursed	ODA	Grant	Cross-Cutting	Environmental education/ training / 41081	Uganda	CRS 2010001260 / Grøn Skole Program
Uganda	5,522	820	Disbursed	ODA	Grant	Adaptation	Environmental education/ training / 41081	Uganda	CRS 2011001469 / Overgangsstøtte til Ugandas klimakoordineringsenhed
Uganda	463,727	68,887	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2011001556 / Firmenich og Uvan (U) Ltd
Uganda	445,951	66,246	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Uganda	CRS 2012001213 / International Woodland Company og Continental Forests Ltd.
Uganda	114,029,668	16,939,163	Disbursed	ODA	Grant	Cross-Cutting	Water supply - large systems / 14021	Uganda	CRS 2013001184 / Sektorbudgetstøtte til vandforsyning i landområder
Uganda	27,500,740	4,085,248	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001353 / Fælles donorfond
Uganda	1,880,272	279,315	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001354 / Langsigtet teknisk bistand
Uganda	777,792	115,541	Disbursed	ODA	Grant	Cross-Cutting	Water sector policy and administrative management / 14010	Uganda	CRS 2013001355 / Administration/review
Uganda	10,773,801	1,600,453	Disbursed	ODA	Grant	Mitigation	Agricultural development / 31120	Uganda	CRS 2014001147 / (tom)
Uganda	10,969,477	1,629,521	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149ab / xxxx
Uganda	4,295,016	638,027	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149ac / xxxx
Uganda	8,299,772	1,232,935	Disbursed	ODA	Grant	Cross-Cutting	Rural development / 43040	Uganda	CRS 2014001149aa / xxxx
Uganda	563,903	83,768	Disbursed	ODA	Grant	Cross-Cutting	Agricultural development / 31120	Uganda	CRS 2014001151 / xxxx
Ukraine	250,000	37,138	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	Ukraine	CRS 2014001401ab / Renewable Energy and Energy Efficiency Programme 2014-17.
Ukraine	610,151	90,638	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	Ukraine	CRS 2014001401ac / Renewable Energy and Energy Efficiency Programme 2014-17.
Ukraine	88,736	13,182	Disbursed	ODA	Grant	Mitigation	Energy generation, renewable sources – multiple technologies / 23210	Ukraine	CRS 2014001401aa / Renewable Energy and Energy Efficiency Programme 2014-17.
Viet Nam	28,798	4,278	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Viet Nam	CRS 2006001132ab / Technical assistance
Viet Nam	948	141	Disbursed	ODA	Grant	Cross-Cutting	Basic drinking water supply and basic sanitation / 14030	Viet Nam	CRS 2006001132ac / Technical assistance
Viet Nam	1,509,411	224,224	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2008001365 / Støtte til Nationalt Klimaprogram
Viet Nam	558,963	83,034	Disbursed	ODA	Grant	Mitigation	Energy policy and administrative management / 23110	Viet Nam	CRS 2008001366 / Støtte til Nationalt Energieffektivitetsprogram
Viet Nam	949,913	141,110	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2008001367 / Programovervågning
Viet Nam	4,525,351	672,243	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2012001287ab / Klimapuljen 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	3,759,895	558,534	Disbursed	ODA	Grant	Mitigation	Environmental policy and administrative management / 41010	Viet Nam	CRS 2012001287aa / Klimapuljen 2012: Vietnam - Low carbon transition in the energy efficiency sector
Viet Nam	579,451	86,078	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2013001197 / Vestas and Cong Ly Collaboration on Wind Farm Development in Vietnam
Viet Nam	794,890	118,081	Disbursed	ODA	Grant	Cross-Cutting	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2013001198 / Vietnamese Danish Aquaculture Technology Excellence Centre
Viet Nam	364,254	54,110	Disbursed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development / 32130	Viet Nam	CRS 2014001245 / Biomass Briquettes Production in Can Tho
Viet Nam	479,837	71,280	Disbursed	ODA	Grant	Cross-Cutting	Multisector aid / 43010	Viet Nam	CRS 2015001175 / Evaluation of Vietnam: Transition from Aide to Trade

Note: Explanation of numerical footnotes is provided in the documentation box after tables 7, 7(a) and 7(b).

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 20XX-3 and 20XX-2, where 20XX is the reporting year.

[b] Parties should report, to the extent possible, on details contained in this table.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as disbursed and committed. Parties will provide the information for as many status categories as appropriate in the following order of priority: disbursed and committed.

[d] Parties may select several applicable sectors. Parties may report sectoral distribution, as applicable, under "Other".

[e] Parties should report, as appropriate, on project details and the implementing agency.

[f] Parties should explain in their biennial reports how they define funds as being climate-specific.

[g] Please specify.

[h] This refers to funding for activities which are cross-cutting across mitigation and adaptation.

Exchange rate 2016: USD 1 = DKK 6.731718, Source: OECD (https://data.oecd.org/conversion/exchange-rates.htm)

Documentation box for Tables 7, 7(a) and 7(b)

Documentation box:

1: Core/general

Core funding provided to listed multilateral institutions has been identified based on information on individual grants in CRS++ (Type of Aid set as "B02 - Core contributions to multilateral institutions"). In addition to the institutions listed in the CTF, core funding provided for other multilateral institutions with climate related project portfolios have been included, specifically support for: *CGIAR*, *the International Fund for Agricultural Development*, *the Multilateral Fund for the Implementation of the Montreal Protocol*, *Nordic Development Fund*, *UN International Strategy for Disaster Reduction*, *United Nations Industrial Development Organisation*, and *World Food Programme*.

Only core funding to the multilateral institutions listed on the most recent OECD-DAC list of 7 July 2017 (http://www.oecd.org/dac/stats/annex2.htm) is reported under the "Core/general" heading. The figures reported are 100% of the total amounts of disbursed grants. The figures are not imputed and Denmark is not providing any estimates concerning the climate-related share for core funding to the multilateral institutions. This also applies to the funding to the Global Environment Facility.

Core funding provided to Multilateral climate change funds, other than the Global Environment Facility, and to the Global Green Growth Institute is not counted as core funding, but instead included as climate-specific funding.

Core funding to the World Bank has been divided into support provided to specific institutions, including the International Development Association and International Bank for Reconstruction and Development. Support provided for the Multilateral Debt Relief Initiative is not included in the core funding. The reported funding for African Development Bank includes funding for the African Development Fund (as a seperate project) and the reported funding for Asian Development Bank includes funding for the Asian Development Fund.

2: Climate specific

The core/general and climate-specific data are mutually exclusive. Thus, what is reported as climate-specific is not included in the core/general. Funding has been seperated based on information on individual grants in CRS++, so climate-specific funds do not have a Type of Aid set as "B02 - Core contributions to multilateral institutions". In addition, some types of aid are not included in the reporting, specifically "F01 - Debt relief", "G01 - Administrative costs not included elsewhere", "H01 - Development awareness", and "H02 - Refugees in donor countries".

The categories “mitigation”, “adaptation”, “cross-cutting” and “other” are mutually exclusive. Mitigation and adaptation support are defined in line with the OECD DAC definitions, based on the applied Rio markers. Cross-cutting activities are those that involve both mitigation and adaptation components. Total amount for climate-specific contributions is calculated as 50% of contributions to projects with a Rio-marker 1 ("Significant") for adaptation and/or mitigation. 100% is given for projects with Rio-marker 2 ("Principal"). In cases where mitigation is the principal objective and adaptation is a significant objective is the project and related funding counted as relating 100% to mitigation (and the other way around if adaptation is the principal objective while mitigation is a significant objective). Denmark reports contributions to such projects and 100% funding for the principal objective and 0% funding for the significant objective, as the total climate-specific funding cannot exceed 100%.

Denmark separates climate-specific multilateral funding not provided as core funding (“Multi-bi” funding) from the climate-specific funding from bilateral, regional and other channels. This separation is based on OECD DAC channel codes and the multilateral funds are reported in Table 7(a). Multilateral funding is defined as all funding with channel codes "40000 - Multilateral Organisations".

Denmark reports core funding for the institutions listed as climate-specific in table 7(a) as climate-specific multilateral funding. These institutions are Least Developed Countries Fund, Special Climate Change Fund, Adaptation Fund, Green Climate Fund, UNFCCC Trust Fund for Supplementary Activities, and Other multilateral climate change funds. Denmark also report core funding to the Green Growth Institute (GGGI) as climate-specific.

Smaller amounts of climate-specific funding to a number of non-UN institutions have been included in Table 7(a) under Multilateral financial institutions, including regional development banks "7. Other". These are collectively identified as "Other (Other multilateral institutions)", and include support provided to *Intergovernmental Authority on Development*, *International Energy Agency*, *Mekong River Commission*, *Organisation for Economic Cooperation and Development*, and *Southern African Development Community*. Some of the funding provided to these institutions were in Denmarks Second Biennial Report reported under bilateral, regional and other channels in Table 7(b).

Information on Project/programme/activity in Table 7(b) include both the name of the project as provided in CRS++ and the CRS Identification Number.

3: Status

Denmark reports figures for disbursements.

4: Funding source

Denmark's Third Biennial Report include figures for official development assistance (ODA) and for other official flows (OOF).

5: Financial instrument

Denmark's Third Biennial Report is limited to include figures on grants and equity. Finance identified by the CRS++ category "Type of Finance" as "110 - Standard grant", "210 - Interest subsidy", and "310 - Capital subscription on deposit basis" have been classified as grants, while finance identified as "510 - Common equity" have been classified as equity.

No loan instruments, guarentees or debt relief instruments have been included in the reported figures.

6: Type of support

The types of support that can be reported are “Mitigation”, “adaptation”, “cross-cutting” and “other”. The applied Rio-markers are used to distinguish between the different support types. Contributions relating to programmes, projects and activities assigned a positive Rio-marker for either mitigation or adaptation are reported under the relevant heading. Definitions of mitigation and adaptation is defined in accordance with the definition in set down by OECD DAC in the *Converged Statistical Reporting Directives for the Creditor Reporting System (CRS) and the Annual DAC Questionnaire* including the detailed information found in Annex 18 of the directive. Mitigation seeks to limit climate change by reducing the emissions of GHGs or by enhancing sink opportunities. Adaptation aims to lessen the adverse impacts of climate change. Crosscutting is used for funding for activities which is crosscutting across mitigation and adaptation. Contributions relating to programmes, projects and activities assigned a positive Rio-marker for both mitigation and adaptation are reported as crosscutting.

For multilateral institutions receiving both core funding and climate-specific funding, the type of support refers only to the climate-specific part of the funding.

For multilateral institutions receiving several different types of support, the amounts have been specified on individual lines in Table 7(a).

7: Sector

The sectors have been defined based on the purpose code as defined by DAC-DCD. The purpose codes reported here follow the list of CRS purpose codes taking effect in 2017 reporting on 2016 flows. The sectors reported are the sectors where each purpose code belongs. The information provided include both the name of the sector and the purpose code.

For multilateral institutions receiving both core funding and climate-specific funding, the sector refers only to the climate-specific part of the funding.

For multilateral institutions receiving support for more than one sector, the percentage attributed to each sector is specified in Table 7(a).

Each Party shall provide an indication of what new and additional financial resources they have provided, and clarify how they have determined that such resources are new and additional. Please provide this information in relation to table 7(a) and table 7(b).

New and Additional (cf. CTF note to Table 7): According to the reporting requirements, Annex II parties shall clarify how they have determined if resources are new and additional. When the terminology “new and additional” was used in Article 4.3 of the UNFCCC, the intent was to ensure that no development assistance funds would be diverted by Annex II developed country Parties to meet their obligations under the Convention. There is still not any agreement on a definition of new and additional. Denmark sees climate and development assistance as strongly interdependent and, as climate is mainstreamed in Danish development assistance, climate finance cannot be clearly separated from development finance altogether, except for the earmarked funds in the Climate Envelope.

TABLE 8: PROVISION OF TECHNOLOGY DEVELOPMENT AND TRANSFER SUPPORT

Table 8							
Provision of technology development and transfer support [a,b]							
Recipient country and/or region	**Targeted area**	**Measures and activities related to technology transfer**	**Sector [c]**	**Source of the funding for technology transfer**	**Activities undertaken by**	**Status**	**Additional information [d]**
	Mitigation		Energy	Private	Private	Implemented	
	Adaptation		Transport	Public	Public	Planned	
	Mitigation and adaptation		Industry	Private and public	Private and public		
			Agriculture				
			Water and sanitation				
			Other				
Ethiopia, Mexico, South Africa, Vietnam, Ukraine, Turkey and Indonesia)	Mitigation	Assist countries with energy planning and transition to renewal energy	Energy	Public	Public	Implemented	NC7: Chapter 7.4.2.8 BR3: Chapter VI.4.2.8
Global/International	Mitigation and adaptation	The Climate Technology Centre and Network, CTCN (UNEP-DTU)	Other (Technology), Energy	Public	Public	Implemented	NC7: Chapter 7.4.2.5 BR3: Chapter VI.4.2.5
International and China	Mitigation	Two engagements through the International Energy Agency (IEA): i) IEA China Energy Cooperation Centre (CECC) that contribute to China's sustainable energy transition. ii) Clean Energy Ministerial Secretariat (CEM Secretariat) is facilitating exchange of best practice of clean energy policies	Other (Technology), Energy	Public	Public	Implemented	NC7: Chapter 7.4.2.8 BR3: Chapter VI.4.2.8
Kenya	Adaptation	Promotion of green technologies in Strategic Sector Cooperation with Kenya	Other (Technology)	Public	Public	Implemented	NC7: Chapter 7.4.2.7 BR3: Chapter VI.4.2.7

[a] To be reported to the extent possible.
[b] The tables should include measures and activities since the last national communication or biennial report.
[c] Parties may report sectoral disaggregation, as appropriate.
[d] Additional information may include, for example, funding for technology development and transfer provided, a short description of the measure or activity and co-financing arrangements.

TABLE 9: PROVISION OF CAPACITY-BUILDING SUPPORT

Table 9			
Provision of capacity-building support [a]			
Recipient country/ region	**Targeted area**	**Programme or project title**	**Description of programme or project [b,c]**
	Mitigation Adaptation Technology development and transfer Multiple areas		
Bangladesh	Adaptation	Climate Change Adaptation Project	Denmark has 2013 to 2016 supported Bangladesh with a Climate Change Adaptation Project that has with a participatory approach was focused on adaptation of rural infrastructure to climate change. Including upgrading, constructing and maintaining of climate resilient and sustainable rural roads.
Bolivia	Adaptation and Mitigation	Promotion of Sustainable Natural Resource Management & Climate Change (Bolivia Country Programme - part III)	The programme is with 236 mio. DKK (2014-2018) supporting supported: i) Improved forest management and livelihood in national parks and forestry areas, ii) Improved energy efficiency, use of renewable energy and cleaner technologies and iii) Climate change mitigation and adaptation (indicators will be based on monitoring system that will be developed during 2013/14, including reduces rate of deforestation and emissions compared to a base scenario, adaptation of production and management methods related to forest management.
Ethiopia	Adaptation	Greening of Agricultural Transformation in Ethiopia (GATE) thematic programme	The thematic programme is designed to i) accelerate a green" transformation of the agricultural sector with a focus on the Ethiopian small-holder farmers and ii) gather speed to the mainstreaming and implementation of Ethiopian climate resilient green economy initiatives within agriculture and forestry.
Global	Mitigation	Program to support sustainable energy systems via Fossil Fuel Subsidy Reform	Denmark is among 15 donors supporting ESMAP, which is a World Bank technical assistance and knowledge programme providing advisory and analytical services to low- and middle income countries to increase their capacity to achieve sustainable energy solutions for poverty reduction and low carbon development.
Global	Adaptation	Least Developed Countries Fund	LDCF has funded developments of NAPAs, and at this stage all LDCs have an approved NAPA in place. Almost all countries which have produced an approved NAPA have at least one LDCF project. In total, 138 projects have been endorsed (by May 2016), where 67% of the financing goes to Africa and Asia and Pacific receives 30% of the finance. This largely reflects the geographical distribution of the LDCs.
Ethiopia, Mexico, South Afric	Mitigation	Assist countries with energy planning and transition to renewal energy	The Danish Energy Agency cooperates with the governments of several emerging economies with focus on policy improvements in long term energy planning and modelling, renewable energy integration and deployment, energy efficiency interventions and in climate change mitigation.
Kenya	Mitigation	Promotion of green technologies in Strategic Sector Cooperation	The project is designed to strengthen the capacity of Kenyan partners to mitigate uncontrolled emissions of untreated solid waste and waste water affecting health and the quality of the livelihood of Kenyan citizens in a context of circular economy.
South of Sahara, regional	Mitigation	Enhancing the capacity of the organic movements in East Africa, ECOMEA	A regional market in the East African Community for organic products that will contribute to; poverty alleviation and income generation for small holder farmers in the region; improved nutritional status for consumers; mitigation of climate changes; is developed. Trade facilitation project in collaboration with Organic Denmark.
Mozambique	Multiple Areas	Adaptation and building climate change resilience in	Programme supporting programmes for adaptation and building climate change resilience (between 2011 and 2016) in collaboration with central government, municipalities, and civil society organisations.

[a] To be reported to the extent possible.

[b] Each Party included in Annex II to the Convention shall provide information, to the extent possible, on how it has provided capacity-building support that responds to the existing and emerging capacity-building needs identified by Parties not included in Annex I to the Convention in the areas of mitigation, adaptation and technology development and transfer.

[c] Additional information may be provided on, for example, the measure or activity and co-financing arrangements.

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