Iceland´s Sixth National Communication and First Biennial Report

Under the United Nations Framework Convention on Climate Change

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1 Summary

This report covers Iceland‘s Sixth National Communication and First Biennial Report as required under the Framework Convention on Climate Change and the Kyoto Protocol. The 1st Biennial report is attached as an annex to the 6th National Communication. The report was prepared in accordance with UNFCCC guidelines and provides a comprehensive account of Iceland‘s circumstances and actions in relation to climate change.

National circumstances

Iceland is a parliamentary democracy. Most executive power rests with the Government, which traditionally is supported by a majority of Althingi, the Parliament. Althingi has 63 members, and parliamentary elections are held every four years. A president is elected by direct popular vote for a term of four years, with no term limit. The country is divided into 74 municipalities, and local authorities are elected every four years.

The population of Iceland is 322,000 and has increased by 27% since 1990. A medium estimate predicts that the population will have reached around 415,000 in 2050. Iceland is the second-largest island in Europe and the third largest in the Atlantic Ocean, with a land area of 103,000 square kilometers. Iceland is the most sparsely populated country in Europe with a population density of three inhabitants per square kilometer. Settlement in Iceland is primarily along the coast. More than 60% of the nation lives in the capital, Reykjavik, and neighbouring communities.

Iceland is situated just south of the Arctic Circle. The mean temperature is considerably higher than might be expected at this latitude. Relatively mild winters and cool summers characterize Iceland’s oceanic climate. The average monthly temperature varies from -3 to +3 °C in January and from +8 to +15°C in July. Storms and rain are frequent, with annual precipitation ranging from 400 to 4000 mm on average annually, depending on location. The amount of daylight varies greatly between the seasons. For two to three months in the summer there is almost continuous daylight.

The Mid-Atlantic Ridge runs across Iceland from the south-west to the north-east. This area is characterized by volcanic activity, which also explains the abundance of geothermal resources. Glaciers are a distinctive feature of Iceland, covering about 11% of the total land area. Soil erosion and desertification have resulted in a disapperance of more than half of the vegetation cover since the settlement of Iceland. Remnants of the former woodlands now cover only about 1% of the total surface area.

Iceland has access to rich marine resources in the country’s 758,000-km^2 exclusive economic zone. Iceland is the 19th largest fishing nation in the world and the marine sector is one of the main economic sectors and backbone of export activities. Total allowable catches are issued with the aim of promoting conservation and efficient utilization of the marine resources. All commercially important species are regulated within the system. A comprehensive fisheries management system based on individual transferable quotas has been developed.

Iceland has extensive domestic energy sources in the form of hydro and geothermal energy. Oil has almost disappeared as a source of energy for space heating and domestic energy has replaced oil in industry and in other fields where such replacement is feasible and economically viable. Iceland ranks first among OECD countries in the per capita consumption of primary energy, which can largely be explained by power intensive industries and the high proportion of geothermal energy in the energy mix. Production of non-ferrous metals accounts for 77% of the electricity consumption.

The largest industries in Iceland are power-intensive primary industries which produce exclusively for export. Power-intensive products, mainly aluminum, amounted to 38% of total merchandise exports in 2011. Tourism has increased rapidly demonstrated by a 75% increase in the number of visitors arriving through Keflavik Airport from 2003 to 2011. Tourists visiting Iceland in 2011 were almost twice as many as the total population.

The domestic transportation network consists of roads and air transportation. Private car ownership is widespread. Aviation plays a key role in Iceland. The country's geographical location makes undisturbed international air transportation imperative. Domestic aviation is also important because of long travel distances within the country combined with a small population.

Greenhouse gas inventory information

Iceland‘s total emissions of greenhouse gases, excluding LULUCF, were 4.4 Mt of CO_2-equivalent in 2011. Carbon dioxide dominated (76%), methane and nitrous oxide contributed with 10% each and the remaining 4% were HFCs (2.7%), PFCs (1.4%) and SF_6 (0.07%). Industrial processes was the largest source of emissions followed by the energy sector, agriculture and waste. Greenhouse gas emission in 2011 were 25.8% above the emissions in 1990. The emissions peaked in 2008 and have declined since. The main driver behind increased emissions was the development of primary production of non-ferrous metal. Other drivers are population increase and growth in GDP.

Iceland will meeting its obligations during the first commitment period of the Kyoto protocol, 2008–2012. Iceland's Kyoto obligation was to keep GHG emissions during the commitment period within 10% above 1990 levels. Emissions of additional CO_2 up to a 1.6 Mt per annum from new heavy industry originating after 1990 are authorized by Decision 14/CP.7, on the Impact of Single Projects, if the industry meets the prescribed conditions. In 2011, 1.2 Mt of CO_2 emitted fulfilled the criteria in Decision 14/CP.7.

Policies and measures

A Climate Change Strategy was adopted the Icelandic government in 2007. The strategy was conceived as a framework for action and government involvement in climate change issues. A long-term vision was set forth for the reduction of net emissions of greenhouse gases by 50-75% until the year 2050, using 1990 as a base year. Emphasis is placed on reducing net emissions by the most economical means possible and in a way that provides additional benefits, by actions such as including the introduction of new low- and zero-carbon technology, economic instruments, carbon sequestration in vegetation and soil, and financing climate-friendly measures in other countries.

A Climate Change Action Plan was endorsed by the government in 2010. The Action Plan is a main instrument for defining and implementing actions to reduce emissions of greenhouse gases and enhance carbon sequestration. The Climate Change Action Plan builds on the results of the expert group tasked with exploring technical possibilities of mitigating greenhouse gas emissions in different sectors of the Icelandic economy. The Action Plan covers economy wide measures and the responsibility for implementation and financing of mitigation actions are distributed across different ministries and agencies. Ten key action and 22 additional actions are specified in the Climate Change Action Plan. A committee appointed in 2011 oversees the implementation of the action plan, makes proposals for new projects, and provides information and advice. The committe issues annual status reports where the Action Plan is reviewed both in terms of implementation of key actions, and actual emissions trends compared to set objectives.

The EU Emissions Trading Scheme (EU-ETS) was transposed into Icelandic law in 2011. Aviation became part of the emission trading system in 2012 and primary production of non-ferrous metals in 2013. The emission trading system covers about 40% of emissions from Iceland. A carbon tax on fossil fuel use was introduced in 2010. The tax is levied on fossil fuels in liquid or gaseous form with respect to the carbon content of the fuels. With these measures more than 90% of CO_2 emissions are covered by economic instruments in Iceland.

Various changes have been made in taxes and levies with the aim of reducing emissions from transportation. The excise duty on passenger cars and the semi-annual road tax are now based on carbon dioxide emissions. The Director of Customs is authorized at clearance to waive VAT on electric or hydrogen vehicles up to a certain maximum and there are special provisions regarding the excise duty and semi-annual road tax for vehicles that drive on methane gas. A minimum of 3.5% renewable fuel of the total energy content of the fuel for land transportation will be required from 1 January 2014 and a minimum of 5% from 1 January 2015. Efforts have been made regarding official procurement of low-carbon and fuel efficient vehicles, and increased share of public transport, walking and bicycling in transport.

The policy on waste management is manifested in in national plans and in legislation. The share of organic waste destined for landfills shall have been reduced to 50% of total waste in 2013 and 35% in 2020, with 2005 as a reference year. The objective for 2013 had been surpassed in 2009. Recovery of waste has increased and primitive waste incinerators and unmanaged landfills have been closed. About 66% of waste was recovered in 2011 compared with 15% in 1995. The percentage of landfilled waste was 31% in 2011 compared with 79% in 1995. Landfill gas is collected at Iceland‘s largest landfill, and the methane is used for powering vehicles in the capital area.

Iceland selected revegetation as an activity in the land-use, land-use change and forestry sector for the first commitment period of the Kyoto protocol. A Parliament resolution was passed in 2002 on a revegetation action plan. Sequestration of carbon in vegetation and soil is among four main objectives stated in the action plan. The action plan sets the framework for revegetation activities in the period 2003 – 2014. Work has started on the preparation for a new revegetation action plan. Act No. 95/2006 sets the framework for regional afforestation projects. Afforestation on at least 5% of land area below 400 m above sea level should be aimed for in each of the regional projects. Regional afforestation plans spanning 40 years shall be made for each of the five regions. Contracts spanning at least 40 years on participation in afforestation projects shall be made with each landowner who receives funding. The regional projects fund up to 97% of agreed afforestation costs.

Projections and the total effects of measures

A new with measures projection to 2020 and 2030 was made for the submission of the 6th National Communication and 1st Biennial Report. Iceland‘s 2010 Climate Change Action Plan was based on business-as-usual emissions projection scenario and a „with-measures“-projection derived by subtraction of estimated mitigation gains from individual actions. Some of the measures in the Action Plan have been taken into account although not all of the have been fully implemented. The new projection is the first to estimate emissions and carbon sequestration up to 2030 and hence forms a basis for a longer-term action plan to reduce net emissions. As the new projection was made just before the submission of the 6th NC, a reevaluation of the Action Plan on the basis of the projection has not been concluded.

Greenhouse gas emission in Iceland peaked in 2008 at almost 5 Mt CO_2-eq (excl. LULUCF) and decreased thereafter to 4.4 Mt in 2011, a 12% reduction. Carbon dioxide made up 75% of the emissions in 2011, the share of methane and nitrous oxide was 10% each, the share of HFC was 2.7% and PFCs amounted to 1.4%. The composition of the greenhouse emissions is projected to remain largely stable until 2030. Carbon dioxide and PFCs are projected to remain constant, methane emissions to decrease to 8%, nitrous oxide to increase to 11%, HFCs to increase to 4%. Emissions of SF_6, which amount to less than 0.1% of total emissions, are projected to remain constant at their 2011 level.

Emission projections estimate that total emissions (excl. LULUCF) will decrease in comparison with 2011 levels by about 75 Gg CO_2-eq until 2020 and 100 Gg CO_2-eq until 2030.

The energy sector accounted for 40% of total greenhouse gas emissions in 2011. The main subsectors were transport (49%), fishing (29%), manufacturing industries and construction

(11%) and geothermal energy extraction (10%). Emissions from road transport dominated the transport sector in 2011 (95%). Emissions from road transport have decreased since 2007. The emissions are projected to decrease by 96 Gg between 2011 and 2020 and by 201 Gg between 2020 and 2030. Emissions from fishing have decreased since 1996. After 2002 emissions reductions have been primarily due to improed fuel efficiency. Continued decrease in emissions from fishing is projected until 2020. The emissons are projected to increase again after 2020 as a steady-state catch is reached for the fish stocks. Important stationary sources of emissions in the manufacturing industries and construction comprise have been the fishmeal industry and cement production. The cement factory was closed in 2012, and the use of electricity has gradually been replacing oil in the fishmeal industry. More than half of emissions in construction are from mobile sources. Emissions from the sector declined rapidly after 2008 and are projected to remain at its 2011 level until 2030. Emissions from geothermal power plants, classified as fugitive emissions, are site and time specific and vary between and within areas. The emissons are projected to remain constant from 2011. Electricity and heat production in Iceland is basically based on renewable energy. Emissions from this sector are therfore very small. The emissions in 2011, 25 Gg, are projected to decrease to 14 Gg in 2020 and remain at that level.

Industrial processes accounted for 41% of greenhouse gase emissions in 2011. Production of non-ferrous metals accounted for 92% of the emission from the sector. These emissions are primarily CO_2, but primary production of aluminium is also a source of PFCs. Much progress has been achieved in reducing emissions of PFCs through improved technology and process control, which lead to a 98% decrease of PFC emitted per tonne of aluminium produced between 1990 and 2005. Emissions from industrial processes are projected to remain constant from 2015 until 2030.

Hydrofluorocarbons (HFCs) are used foremost as refrigerants in Iceland and are banned for most other uses. The HFCs are substitutes for ozone depleting substances and their emissions and stock in the refrigeration systems have increased after imports started in 1993. Emissions of HFCs were 121 Gg in 2011 and are projected to have increased by 29 Gg by 2020 and 34 Gg by 2030.

Agriculture accounted for 14.5% of greenhouse gas emissions (excl. LULUCF) from Iceland in 2011. Enteric fermentation and management of livestock manure creates methane emissions and nitrous oxides are emitted from agricultural soils. Livestock populations, especially cattle and sheep, are key drivers for the emissions. The emissions from agriculture have oscillated between 600 and 700 Gg since 1990. The emissions are projected to be 650 Gg in 2020 and 667 Gg in 2030, which is higher than in 2011 but not as high as the emissions were in 2008.

Dominant greenhouse gas emissions in the waste sector are methane emissions from solid waste disposal on land. Other sources accounting for the remaining 11% of the emissions are waste water handling, incineration and biological treatment of solid waste. Key drivers for the emissions are therfore the composition and amount of landfilled waste. Decrease in emissions is projected in the waste sector because of less amount of organic waste being landfilled. The emissions are projected to be 121 Gg in 2020 and 101 Gg in 2030, compared with 198 Gg in 2011.

Organized forestry started in 1899 in Iceland. In the beginning the efforts focused mainly on protection of the natural birch forest but planting of seedlings increased slowly after World War II. Net removals from afforestation, reforestation and deforestation were 162 Gg in 2011 and are projected to be 266 Gg in 2020 and 361 Gg in 2030. The primary goals of revegetation in Iceland have been prevention of land degradation and erosion, revegetation of eroded areas, restoration of lost ecosystems and to ensure sustainable grazing land use. A special government program to sequester carbon with revegetation and afforestation was initiated in 1998 - 2000 and has continued since. Annual increase of revegetation areas and plantation rate decreased after the onset of the financial crisis in 2008. Net removals of CO_2 due to revegetation amounted to 174 Gg in 2011 and are projected to reach 274 Gg in 2030.

Impacts and adaptation measures

Iceland has experienced considerable warming since the 1980‘s. From 1975 to 2008 the warming rate in Iceland was 0.35°C per decade, which is substantially greater than the globally averaged warming trend (~0.2°C per decade). However, the long term warming rate in Iceland is similar to the global one. In Reykjavík, 2013 was the 18th consecutive year with temperatures above the 1961 – 1990 average and the 13th consecutive year warmer than the 1931 – 1960 average. A precipitation record for the whole of Iceland has recently been established. The results show significant decadal variations in precipitation and a tendency for higher amounts of precipitation during warmer decades. An analysis of the IPCC SRES A1B scenario for many models showed that in the next decades the warming in Iceland is likely to be in the range of 0.2 – 0.4 degrees per decade and that precipitation increase would be about 1% per decade. Projected changes in temperature and precipitation may in some periods be masked by natural inter-decadal variability.

Europe and the North Atlantic is much milder than at comparable latitude in Asia and North America due to heat transport from the south with air and water masses. A key process is the Meridional Overturning Circulation (MOC), circulation due to sinking of seawater because of cooling. Numerical models predict that the production of deep water will be reduced when more fresh water is introduced to the Nordic seas because of melting of glaciers, thawing of permafrost and increased precipitation. With the time series available now it is, however, not possible to conclude that the flow of deep water is decreasing.

Over the last few years the salinity and temperature levels of Atlantic water south and west off Iceland have increased, and there have been indications of increased flow of Atlantic water onto the mixed water areas over the shelf north and east of Iceland in spring and, in particular, in late summer and autumn. This may be the start of a period of higher temperatures and increased vertical mixing over the north Icelandic shelf, but the time series is still to short to enable firm conclusions. Marked changes have been observed in the distribution of many fish species since 1996. Southern species have extended farther north (e.g. haddock, monkfisk, mackerel), a northern species is retreating (capelin), rare species and vagrants have been observed more frequently and 31 species have been recorded for the first time. The response of fish stocks to the warming of the marine environment has been similar to what was observed during the warming between the 1920s and 1960s.

Long term time series of ocean carbon dioxide reveal rapid ocean acidification in the Iceland Sea at 68°N. The surface pH there falls 50% faster than is observed in the sub-tropical Atlantic. The rapid rate of change is because the Iceland Sea is a strong sink for carbon dioxide and the sea water is cold and relatively poorly buffered. The sea water calcium carbonate saturation is low in these waters and it falls with the lowering pH. The biological effects and ecosystem consequences of the carbonate chemistry changes are of concern and are being studied.

Glaciers are a distinctive feature of Iceland, covering about 11% of the total land area. Climate changes are likely to have a substantial effect on glaciers and lead to major runoff changes. Regular monitoring shows that all non-surging glaciers in Iceland are retreating. Runoff from major glaciers is projected to increase and usable hydropower from them is expected to increase by 20% until 2050. A peak runoff is expected to occur in the latter part of the 21st century. Rapid retreat of glaciers leads to changes in the courses of glacial rivers, which may affect roads and other communication lines. The thinning of large glaciers such as the Vatnajökull ice cap reduces the load on the Earth‘s crust which rebounds. Consequently large parts of Iceland are now experiencing uplift. The uplift along the south coast may reduce the impacts of rising global sea levels. The uplift does not reach to the urban south west part, including Reykjavík, which is experiencing subsidence that will exacerbate the impact of rising sea levels. Studies on regional sea level rise indicate that the sea level rise in Iceland may be quiet different from the global average because of the melting of the Greenland ice sheet, which will affect the gravitational field around Greenland in a way that would lower the sea level in the vicinity.

Mean annual temperature increase and other accompanying changes have had a substantial impact on agriculture and forest growth in Iceland. Long-term studies show that a rise in spring temperature by 1°C increases annual hay production by 11%. A problem of frosts that frequently damged hayfields in the past has largely disappeared with the warmer winter climate. Barley production has increased much as a larger part of Iceland is now within required limits of day degrees during the growing season. Warmer climate has also made it possible to grow new crops such as rapeseed and winter wheat. The downy birch treelines are generally moving upwards in Iceland and growth rate has increased. An increased number of pests that can cause damage to trees have emerged in the last two decades. Further warming is expected to increase the vigor and number of new pests. Highland permafrost string bogs, a rare plant community, is under threat from recent warming and might even disappear with further warming.

Financial assistance and transfer of technology

International development cooperation is one of the key pillars of Iceland‘s foreign policy, and the main goal is to contribute to the fight against poverty in the world‘s poorest countries. Iceland endeavours to follow best practices in international development cooperation. Iceland became a full member of the Development Assistance Committee of the OECD (DAC) in March 2013. Iceland began in 2012 the process of implementing the OECD DAC statistical reporting methods, including the usage of the Rio markers. Iceland‘s development cooperation is based on the principles of sustainable development in accordance to the Strategy for Iceland‘s International Development Cooperation.

Iceland contributed about 2.4 million US dollars in new and additional support in 2012 to assist developing countries to adapt and mitigate the adverse effects of climate change. In 2010 the Government of Iceland decided to commit 1 million US dollars to Fast Start Financing to be disbursed in 2011 and 2012. Iceland‘s Fast Start Finance was appropriately balanced between adaptation, mitigation and capacity building, giving special attention to women‘s empowerment. Projects with mitigation or adaptation as a significant or primary object were allocated 9.7 million US dollars in 2012, a 34% increase from 2011.

The UN Geothermal Training Programme is an important part of Iceland‘s multilateral support in the field of renewable energy. The programme offers specialised post-graduate education and training to experts from developing countries. Iceland has also been supporting the International Renewable Energy Agency (IRENA) as well as ESMAP, a renewable energy programme within the World Bank. Iceland and the World bank have made an agreement to collaborate on advancing geothermal utilisation in East Africa, more specifically the 13 countries of the East-African Rift Valley.

Land degradation and desertification rank among the world‘s greatest environmental challenges. The mission of the UNU Land Restoration Training Programme is to train specialists from developing countries to combat land degradation and restore degraded land, and to assist strengthening institutional capacity and gender equality in the field of land restoration and sustainable land management in developing countries.

The UNU Gender Equality Studies and Training Programme (UNU-GEST Programme) was launched in October 2009. The overall aim of the project is to promote gender equality and women’s empowerment through education and training. A training course on how to mainstream gender into climate change actions was developed by the UNU-GEST Programme in close collaboration with Ugandan partners. Training and capacity building was provided for a selected number of expert and policy makers at the district level in Uganda.

Sustainable use of natural resources is a key element in Iceland‘s development efforts. The development and adaptation of fisheries management systems based on recommendations from scientific research are instrumental for climate change adaptation. Iceland cooperatives with Norwegian and Mozambican autorities on a programme based support in Mozambique with an emphasis on reducing poverty and increasing food security. With regard to assistance through multilateral channels, the UNU Fisheries Training Programme is a key partner in capacity building and global education. Iceland has supported the PROFISH programme of the World Bank from its inception.

Iceland‘s international development cooperation strategy places most emphasis on the LDCs and Sub-Saharan Africa is a priority region, specifically Malawi, Mozambique and Uganda. Climate specific bilateral contributions for capacity building i Sub-Saharan Africa amounted to 2.3 million USD in 2012, a 1.4 million USD increase from 2011. A geothermal energy project in Nicaragua made up the largest share of Iceland‘s mitigation effort.

In terms of multilateral financial contributions Iceland places special focus on four international organisations: the World Bank, UNICEF, UN Women and the United Nations University. Contributions to these organisations amounted to 67% of ODA to international organisations in 2012.

Systematic observation

The Icelandic Meteorological Office (IMO) and the Marine Research Institute (MRI) are the most important institutions in Iceland for the observation of climate change.

The IMO is responsible for atmospheric climate monitoring and observation, and monitors and archives data from close to 200 stations. The observations are distributed internationally on the WMO GTS (Global Telecommunication System). The IMO participates in the Global Atmospheric Observing Systems (GAOS). The IMO has participated in the MATCH ozone-sounding program during winter months since 1990 and the data are reported to the International Ozone Data base. Data on global radiation are collected and reported annually to the World Radiation Data Center. The IMO monitors hydrological conditions with a network of about 200 gauging stations in Icelandic rivers. A flow monitoring network to measure and warn against danger from floods is run by the IMO. Glaciers are monitored by the IMO and in a glacier measuring project the IMO work with the Institute of Earth Science at the University of Iceland aiming at high-resolution mapping of the surface of the largest glaciers. Continuous geodetic GPS stations allow IMO staff *inter alia* to monitor isostatic crustal changes that are occurring as a result of glacier thinning.

The MRI maintains a monitoring net of about 70 hydrobiological stations on 10 standard sections (transects) around Iceland. The stations are monitored for physical and biological parameters (temperature, salinity, phytoplankton, zooplankton) and nutrients (phospate, nitrate and silicate). The MRI has monitored carbonate system parameters at two time series stations northeast and west of Iceland since 1983. The MRI has been involved in several projects, which involve monitoring of fluxes over the Greenland-Scotland Ridge, in cooperation with scientists from both sides of the Atlantic Ocean.

Research on Mitigation options and technology

The Iceland Deep Drilling Project (IDDP) could potentially have a great impact on the exploitation of geothermal energy. The main purpose of the project is to find out if it is economically feasible to extract energy and chemicals out of hydrothermal systems at supercritical conditions. The potential benefits of the IDDP include increased power output per well, development of an environmentally benign high-enthalphy energy source below currently producing geothermal fields, extended lifetime of exploited geothemal reservoirs and a reevaluation of the geothermal resource base worldwide. A special issue of Geothermics (vol. 49, 2014) is devoted to the project.

Preparations have been made for initial tests of one of the world‘s first carbon-dioxide mineral storage plant near a geothermal power plant in Iceland. Gas mixture of carbon dioxide and hydrogen sulfide will be pumped from the power plant deep into the basaltic rocks near the plant. Chemical reactions within this reactive volcanic rock type will turn the carbon dioxide into carbonate minerals.

Carbon Recycling International has been developing methods to produce methanol from renewable hydrogen and carbon dioxide, which is obtained from geothermal boreholes using their own catalysis technology.

Education, training and public awareness

The educational system in Iceland is administered by the Ministry of Education, Science and Culture. The National Curriculum Guide applies to all grades and subjects in compulsory schools. Six fundamental pillars of education have been defined. One of the six pillars is *Education towards sustainability*, which concerns the interplay of the environment, economy, society and welfare. At the university level emphasis on education and research in the field of natural resources and environmental science is growing. Several programs are available such as in natural resources sciences and environment and natural resources studies in addition to a variety of individual courses.

The Eco-Schools Programme is an international project funded by the government and managed by the NGO Landvernd. Eco-Schools is a program for environmental management and certification designed to implement sustainable development education in schools. In 2013, 210 schools at all school levels participated in the program, reaching over 45% of children at the pre-school level, 55% of children at the elementary level and 35% of students at the upper secondary level.

Iceland runs four training programmes as a part of the UN University aimed at assisting developing countries in capacity building; The Geothermal Training Programme, The UN University Land Restoration Training Programme, The Gender Equality Studies and Training Programme and the UN University Fisheries Training Programme.

Several public campaigns contribute to reduction of greenhouse gas emissions. The annual *Bike to work* campaign encourages the public to leave the car at home and bike, walk og use public transport to work. The *Bike to school* and *Walk to school* campaigns are directed towards students. They are part of international efforts, i.e. the European Mobility Week and the International Walk to School month. The Ministry for the Environment and Natural Resources manages some awareness projects. Annually the Day of the Environment and the Day of the Icelandic Nature are celebrated nation wide.

The Ministry for the Environment and Natural Resources established a cooperation platform with environmental NGOs with the purpose of increasing dialogue and consultation. Today, in all 19 NGOs participate in the platform.

2 National circumstances

2.1 Government structure

Iceland has a written constitution and is a parliamentary democracy. A president is elected by direct popular vote for a term of four years, with no term limit. Most executive power, however, rests with the Government, which traditionally is supported by a majority of Althingi, the Parliament. Althingi has 63 members, and parliamentary elections are held every four years. The government is headed by a prime minister, and the executive branch is usually divided among 9 - 12 ministers. Judicial power lies with the Supreme Court and the district courts, and the judiciary is independent.

The country is divided into 74 municipalities, and local authorities are elected every four years. The largest municipality is the capital, Reykjavík, with 119764 inhabitants, but the greater capital area has around 200 thousand inhabitants in 7 municipalities. The smallest municipality on the other hand has only 50 inhabitants.

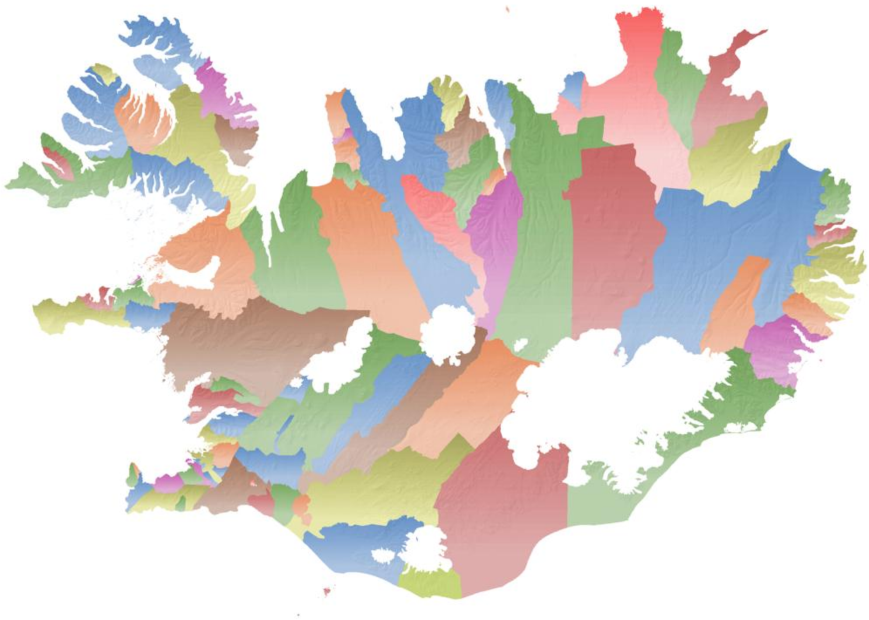

Figure 2.1 Municipalities in Iceland 2013

In 1990 the number of municipalities was 204, but an attempt has been made to unite small municipalities, and this has resulted in fewer, but more populous, municipalities. This trend is likely to continue since the tasks of local authorities have grown increasingly complex in recent years. The local authorities have their own sources of revenue and budgets and are responsible for various areas that are important with regard to greenhouse gas emissions. This includes physical planning, granting industry licenses and the design and operation of public transport. Municipalities also play an important role in education.

The Ministry for the Environment and Natural Resouces is responsible for the implementation of the UNFCCC and coordinated national climate change policymaking in close cooperation with the Ministry of Industries and Innovation, Ministry of the Interior, Ministry of Finance, Ministry of Foreign Affairs and the Prime Minister's Office. Several public institutions and public enterprises, operating under the auspices of these ministries, also participated directly or indirectly in preparing the national implementation policy.

2.2 Population

The population of Iceland was 321,857 on 1 January 2013. The population increased on average by 1% in 2000 – 2004. Rapid growth was seen in the following years peaking in 2006. After the onset of the financial crisis population increase declined rapidly, reaching a negative value, -0.5% in 2009.

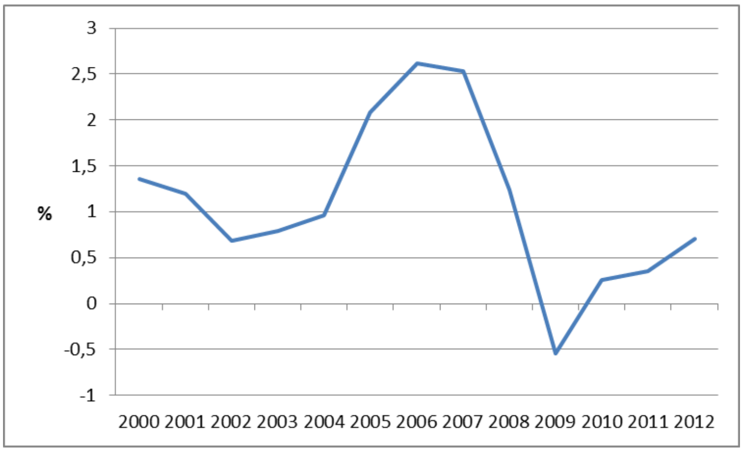

Figure 2.2 Population increase (%) in Iceland

Figure 2.3 shows three scenarios for population growth until 2050. A medium estimate predicts that the population will have reached around 415000 in 2050.

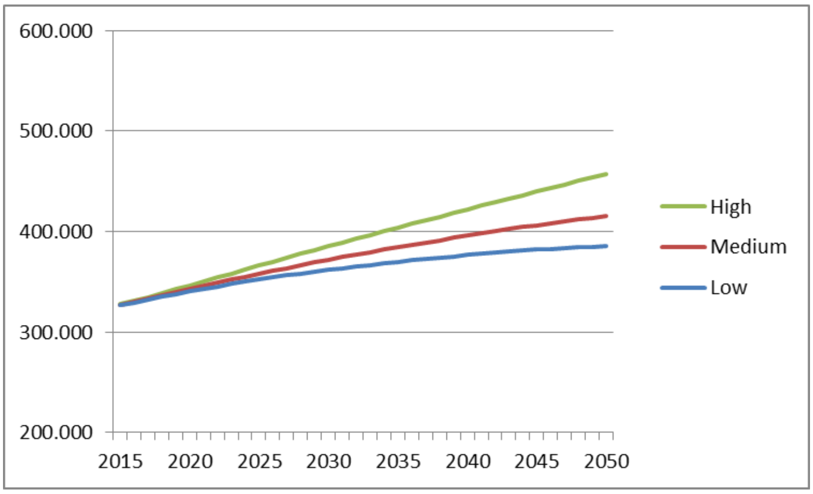

Figure 2.3 Projected population increase in Iceland 2015 – 2050

Settlement in Iceland is primarily along the coast. More than 60% of the nation lives in the capital, Reykjavik, and neighbouring communities.

In 1990 this same ratio was 57%, demonstrating higher population growth in the capital area than in smaller communities and rural areas.

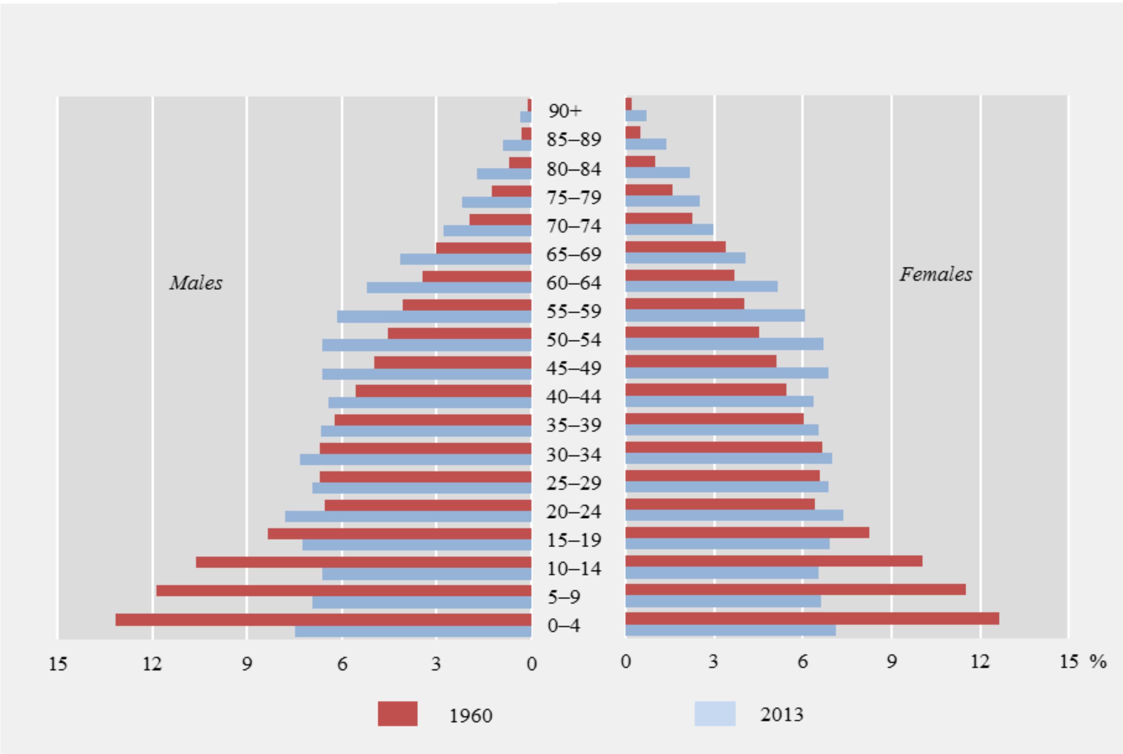

Figure 2.4 Population by sex and age 1960 and 2013

Iceland is the most sparsely populated country in Europe. The population density is three inhabitants per square kilometer. Given the large percentage of the population living in and around the capital, the rest of the country is even more sparsely populated, with less than one inhabitant per square km. Almost four-fifths of the country are uninhabited and mostly uninhabitable, the population therefore being concentrated in a narrow coastal belt, valleys and the southwest corner of the country.

2.3 Geography

Iceland is located in the North Atlantic between Norway, Scotland and Greenland. It is the second-largest island in Europe and the third largest in the Atlantic Ocean, with a land area of some 103 thousand square kilometers, a coastline of 4,970 kilometers and a 200-nautical-mile exclusive economic zone extending over 758 thousand square kilometers in the surrounding waters. Iceland enjoys a warmer climate than its northerly location would indicate because a part of the Gulf Stream flows around the southern and western coasts of the country. In Reykjavík the average temperature is nearly 11°C in July and just below zero in January.

Figure 2.5 Geographic location of Iceland

Geologically speaking, the country is very young and bears many signs of still being in the making. Iceland is mostly mountainous and of volcanic origin. The Mid-Atlantic Ridge runs across Iceland from the south-west to the north-east. This area is characterized by volcanic activity, which also explains the abundance of geothermal resources. Glaciers are a distinctive feature of Iceland, covering about 11% of the total land area. The largest glacier, also the largest in Europe, is Vatnajökull in Southeast Iceland with an area of 8,300 km^2. Glacial erosion has played an important part in giving the valleys their present shape, and in some areas, the landscape possesses alpine characteristics. Regular monitoring has shown that all glaciers in Iceland are presently receding.

Rivers and lakes are numerous in Iceland, covering about 6% of the total land area. Freshwater supplies are abundant, but the rivers flowing from the highlands to the sea also provide major potential for hydropower development. Geothermal energy is another domestic source of energy.

Figure 2.6 Vegetation map of Iceland

Soil erosion and desertification is a problem in Iceland. More than half of the country's vegetation cover is estimated to have disappeared because of erosion since the settlement period. This is particularly due to clearing of woodlands and overgrazing, which have accelerated erosion of the sensitive volcanic soil. Remnants of the former woodlands now cover less than 1,200 km^2, or only about 1% of the total surface area. Around 60% of the vegetation cover is dry land vegetation and wetlands. Arable and permanent cropland amounts to approximately 1,300 km^2. Systematic revegetation and land reclamation began more than a century ago with the establishment of the Soil Conservation Service of Iceland, which is a governmental agency. Reforestation projects have also been numerous in the last decades, and especially noteworthy is the active participation of the public in both soil conservation projects and reforestation projects.

Iceland has access to rich marine resources in the country's 758,000-km^2 exclusive economic zone. The abundance of marine plankton and animals results from the influence of the Gulf Stream and the mixing of the warmer waters of the Atlantic with cold Arctic waters. Approximately 270 fish species have been found within the Icelandic 200-mile exclusive economic zone; about 150 of these are known to spawn in the area.

2.4 Climate profile

Iceland is situated just south of the Arctic Circle. The mean temperature is considerably higher than might be expected at this latitude. Relatively mild winters and cool summers characterize Iceland’s oceanic climate. The average monthly temperature varies from -3 to +3 °C in January and from +8 to +15°C in July. Storms and rain are frequent, with annual precipitation ranging from 400 to 4000 mm on average annually, depending on location. The mild climate stems from the Gulf Stream and attendant warm ocean currents from the Gulf of Mexico. The weather is also affected by polar currents from East Greenland that travel southeast towards the coastline of the northern and eastern part of Iceland.

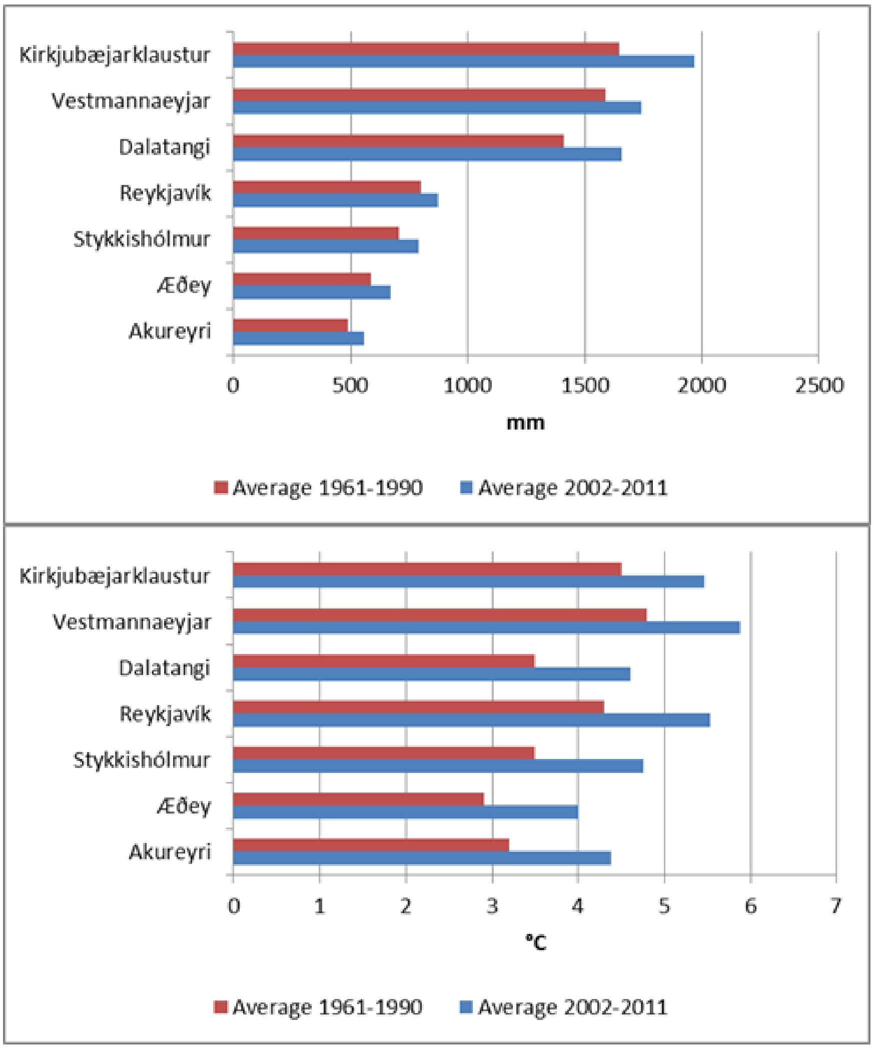

Figure 2.7 Average precipitation (mm) and temperature (°C) in 1961–1990 and 2002-2011. Locations are shown on the map in Figure 2.6

Figure 2.7 shows average temperature and precipitation in seven locations in Iceland. A comparison between a 30 year average, 1961 – 1990 with a recent 10 year period 2002 – 2011 shows increased precipitation and average temperature in all locations.

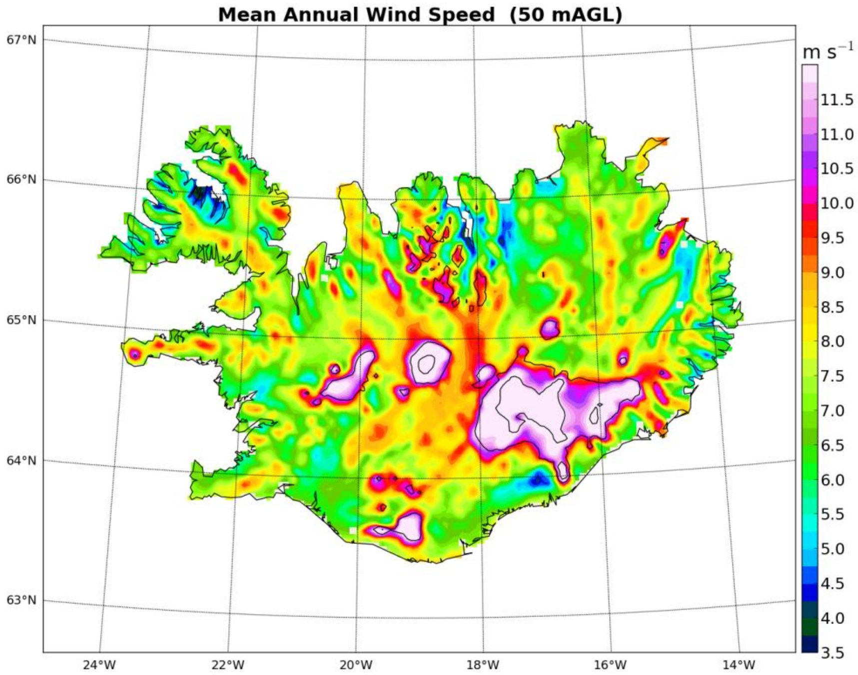

Figure 2.8 Annual average wind speed at 50 m above ground level

Figure 2.8 shows annual average wind speed in Iceland. The figure is from a study of the wind energy potential of Iceland made by the Icelandic Met Office. The study shows that Iceland compares with areas such as Scotland and the western coasts of Ireland and Norway, which are ranked within the highest wind power class in Europe. These areas are characterized by average winds above 6 m/s over sheltered terrain and average winds above 8.5 m/s at the coast, measured at 50 m above ground level.

The amount of daylight varies greatly between the seasons. For two to three months in the summer there is almost continuous daylight; early spring and late autumn enjoy long twilight, but from November until the end of January, the daylight is limited to only three or four hours.

2.5 The Economy

Iceland is endowed with natural resources that include the fishing grounds around the island within and outside the country's 200-mile Exclusive Economic Zone as well as hydroelectric and geothermal energy resources

Policies of market liberalization, privatization and other structural changes were implemented in the late 1980s and 1990s, including membership of the European Economic Area by which

Iceland was integrated into the internal market of the European Union. Economic growth started to gain momentum by the middle of the 1990s, rekindled by replenishing fish stocks and economic efficiency due to sustainable quota allocations, a global economic recovery, a rise in exports and a new wave of investment in the aluminum sector. During the second half of the 1990s, the liberalization process continued, competition increased, the Icelandic financial markets and financial institutions were restructured and expanded rapidly and the exchange rate policy became more flexible. Iceland experienced until 2007 one of the highest growth rates of GDP among OECD countries.

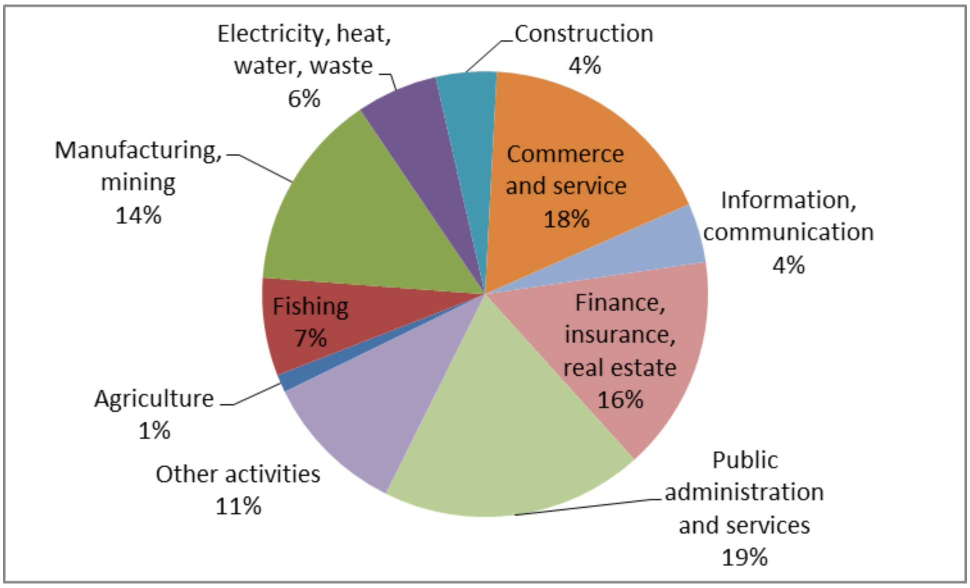

Figure 2.9 Breakdown of GDP in 2012 by sector

Iceland was severely hit by an economic crisis when its three largest banks collapsed in the fall of 2008. The blow was particularly hard owing to the large size of the banking sector in relation to the overall economy as it had grown to be ten times the annual GDP. The crisis has resulted in serious contraction of the economy followed by increase in unemployment, a depreciation of the Icelandic króna by over 40% in 2009 compared with the 1st quarter of 2008 and a drastic increase in external debt. Private consumption has contracted by a quarter since 2007. The GDP contracted by almost 11% in 2009 and 2010. Growth picked up in 2011 and growth was 3.1% in the first nine months of 2013 compared with the same period in 2012.

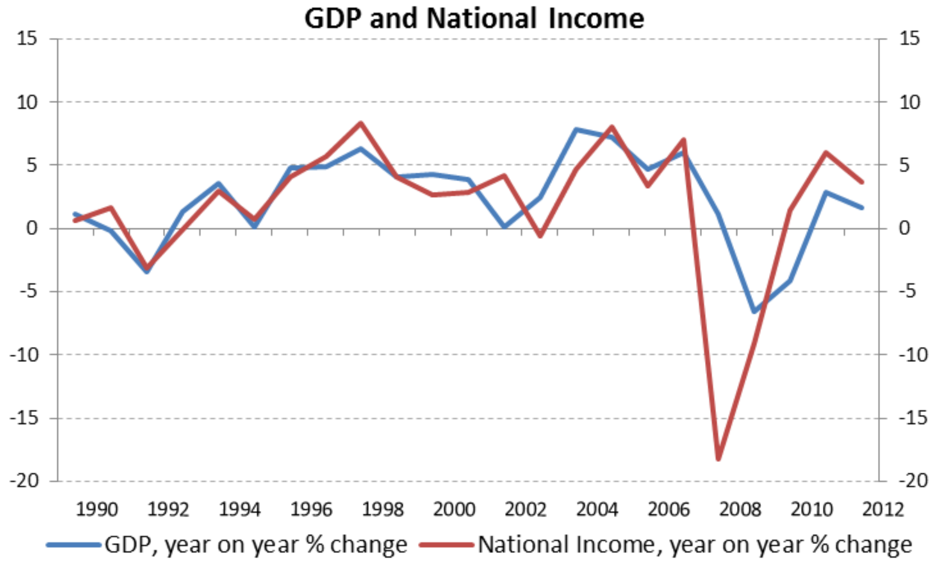

Figure 2.10   GDP and National Income

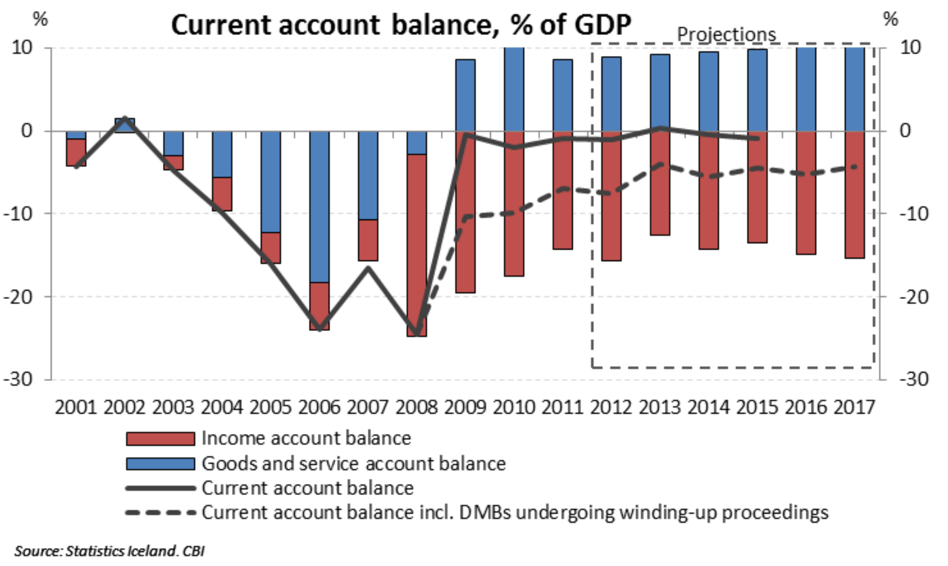

Figure 2.11   Current and projected account balance (percentage of GDP)

The large-scale investment projects in the aluminum and power sectors which commenced in 1997 are now operational. In 2011, the total production of aluminum smelters in Iceland was 800,000 tons, up from 270,000 in 2005 and 100,000 in 1995. Parallel investments in increased power capacity were needed to accommodate for an almost eight-fold increase in aluminum production. Relative to the size of the Icelandic economy these investment projects were very large.

2.6 Development of economic sectors

2.6.1 Fisheries

Iceland is the 19th largest fishing nation in the world, exporting nearly all its catch. The marine sector is still one of the main economic sectors and the backbone of export activities in Iceland although its relative importance has diminished over the past four decades.

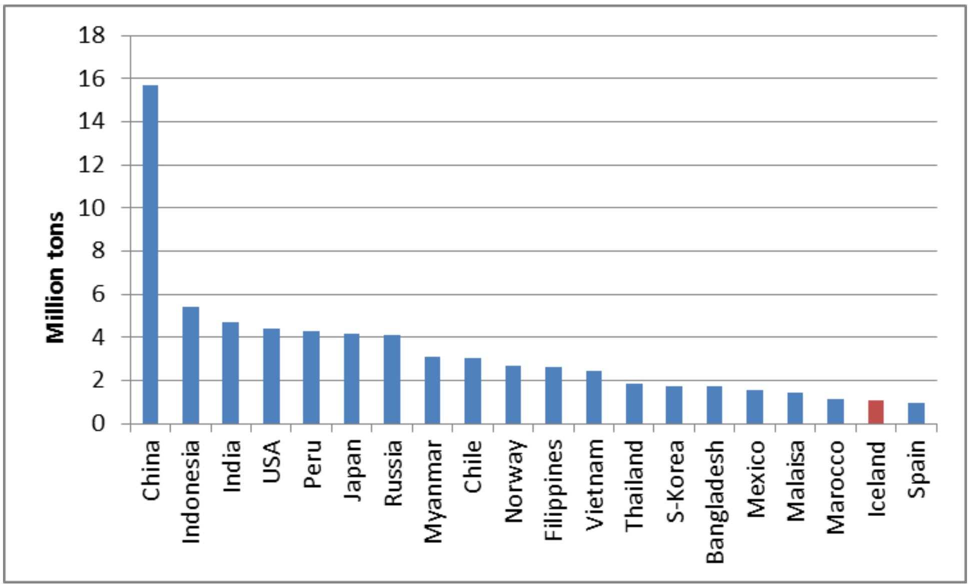

Figure 2.12 World catch – 20 largest fishing nations in 2010

Marine products constituted 40.6% of all merchandise exports, fob, in 2011. A comprehensive fisheries management system based on individual transferable quotas has been developed. Total allowable catches (TACs) are issued with the aim of promoting conservation and efficient utilization of the marine resources. All commercially important species are regulated within the system. In addition to the fisheries management system there are a number of other explicit and direct measures especially to rationalize investments in the fishing sector, to support its aims and reinforce conservation and socio-economic sustainability.

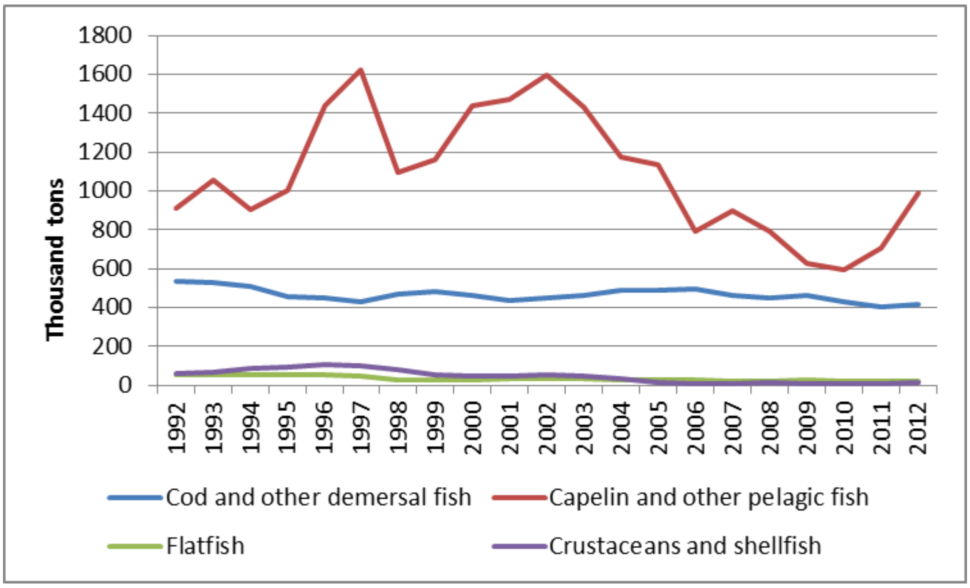

Figure 2.13 Fish catch 1992 - 2012

Figure 2.13 shows significant fluctuations in the total catch of demersal species, which are mainly cod, haddock, ocean perch (red fish) and pollock. The cod fishery is slowly recovering after having declined over 4 – 5 decades from 400 to 200,000 tons per year. Herring and mackrell are important and increasingly valuable pelagic species along with capelin, which still constitutes the main volume of pealgic fishery.

2.6.2 Energy profile

Iceland has extensive domestic energy sources in the form of hydro and geothermal energy. The development of the energy sources in Iceland may be divided into three phases. The first phase covered the electrification of the country and harnessing the most accessible geothermal fields, especially for space heating. In the second phase, steps were taken to harness the resources for power-intensive industry. This began in 1966 with the signing of agreements on the building of an aluminum plant, and in 1979 a ferrosilicon plant began production. In the third phase, following the oil crisis of 1973-74, efforts were made to use domestic sources of energy to replace oil, particularly for space heating and fishmeal production in recent years. Oil has almost disappeared as a source of energy for space heating in Iceland, and domestic energy has replaced oil in industry and in other fields where such replacement is feasible and economically viable.

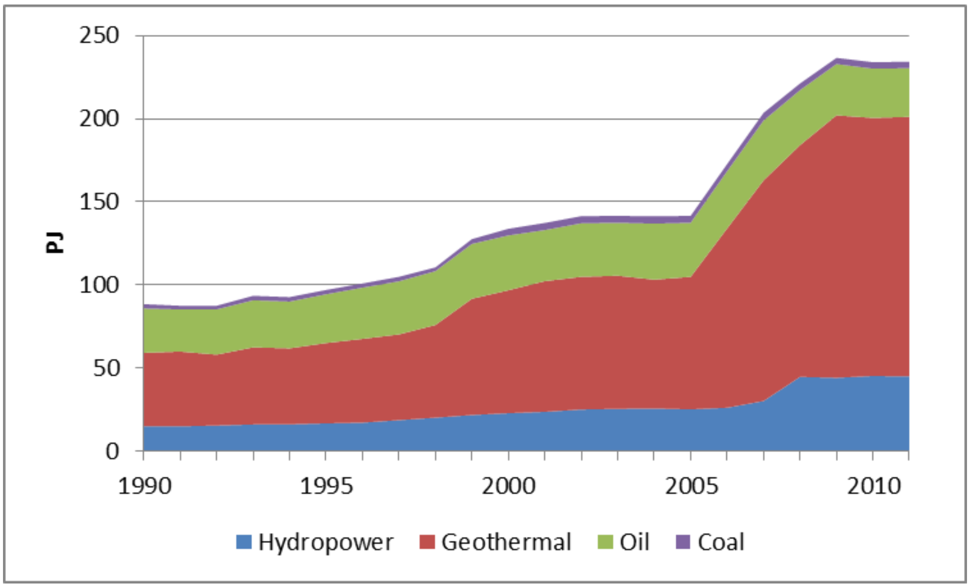

Figure 2.14 Gross energy consumption by source 1990 - 2011

Iceland ranks first among OECD countries in the per capita consumption of primary energy with about 205 MWh per capita, followed by Canada and Norway with about 116 MWh per capita in 2011. High consumption of primary energy can largely be explained by power intensive industries and the high proportion of geothermal energy in the energy mix. Around 100 MWh/capita, calculated as consumption of primary energy, can be attributed to geothermal energy that is not used, cannot be used and losses. Electricity consumption is about one fourth of the total energy consumption amounting to 52 MWh per capita in 2009. Production of non-ferrous metals accounts for 77% of the electricity consumption, primary aluminium production (71%) and production of ferro-silicon (6%).

The energy profile for Iceland is in many ways unique. The use of fossil fuels for stationary energy is very small in Iceland. In 2011, the domestic fishing fleet used one forth of the oil consumed, 44% was used for road transport and equipment, and 22% for aviation. Oil consumption in industry accounted for 4% of the consumption.

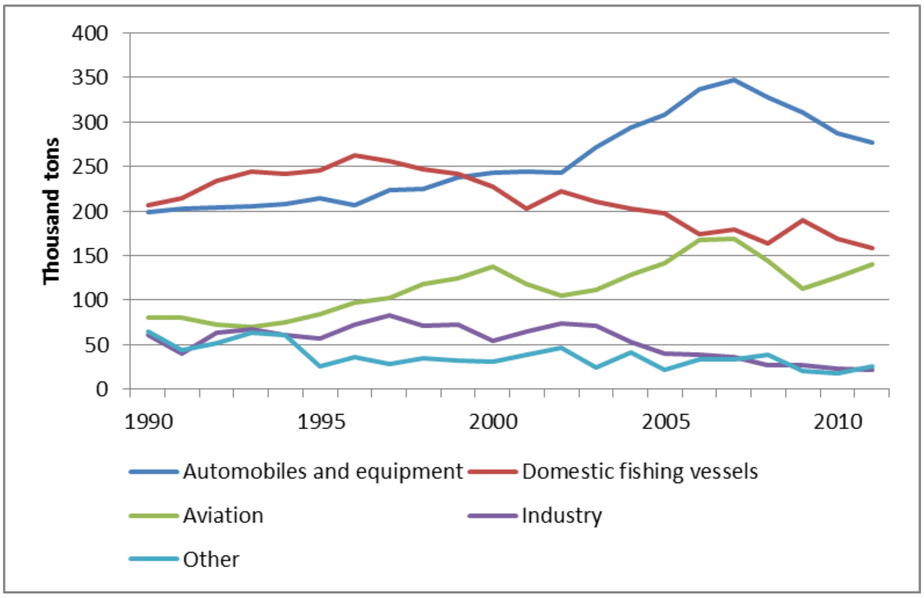

Figure 2.15 Consumption of petroleum products in Iceland 1990 – 2011

Geothermal heat and hydropower account for 86 per cent of the country's primary energy consumption. In 2012, the total installed capacity for electricity production was 2658 MW, 71% in hydropower and 25% in geothermal power plants. Some 90% of all homes in Iceland are heated with geothermal energy.

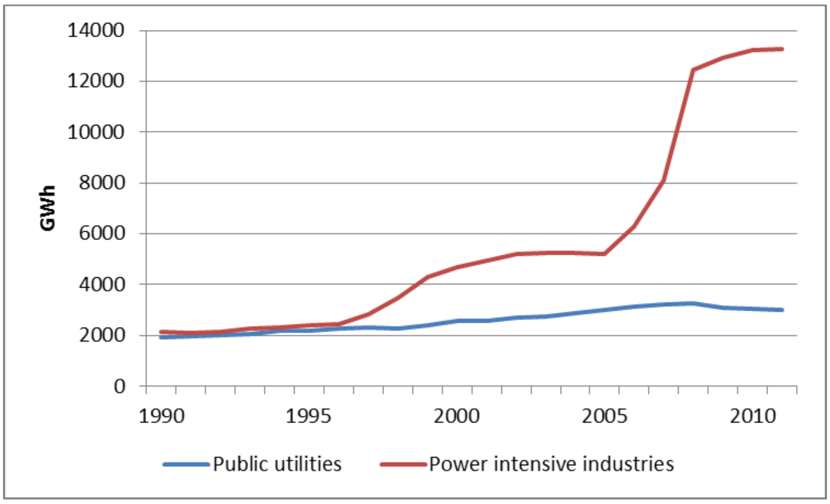

Figure 2.16 Electricity consumption 1990 – 2011

Hydro power developments can have various environmental impacts. The most noticeable is usually connected with the construction of reservoirs, which are necessary to store water for the winter season. Such reservoirs affect the visual impact of uninhabited wilderness areas in the highlands, and may inundate vegetated areas. Other impacts may include disturbance of wildlife habitats, the disappearance or alteration of waterfalls, reduced sediment transportation in glacial rivers downstream from the reservoirs and changed conditions for fresh-water fishing. Geothermal developments may also have environmental impacts, among them the drying up of natural hot springs. Development of high-temperature fields causes air pollution by increasing the natural H_2S emission from the fields. Geothemal power plants, associated steam stack exhaust and transmission piplines for geothermal water create visual impacts in the environment. Noise is associated with boreholes, power generation and water pumps, and pumping water underground at geothermal power plants can lead to earthquakes.

2.6.3 Industry

The largest industries in Iceland are power-intensive primary industries which produce exclusively for export. There has been a considerable increase in industrial exports in recent years. In 2011, manufacturing products accounted for 54% of total merchandise exports, up from 22% in 1997. Power-intensive products, mainly aluminum, amounted to 38% of total merchandise exports in 2011 but 12% in 1997. The second largest industrial product in 2011 was ferro-silicon (3.9%) followed by medicinal products (2.3%). A number of small and medium-size enterprises have emerged in export-oriented manufacturing in recent years, in areas such as medical equipment, pharmaceuticals, capital goods for fisheries and food processing.

The history of non-ferrous metal production in Iceland began in 1970 with the first aluminum smelter, now owned by Rio Tinto Alcan, producing 33 thousand tons of aluminum annually. The annual production capacity of the plant, after four expansion projects, is now about 180 thousand tons. A ferrosilicon plant owned by Elkem started operation in 1979 with annual production of 60 thousand tons of 75% ferrosilicon. The production capacity was increased in 1999 and is now about 120 thousand tons of ferrosilicon per year. A second aluminum plant, owned by Century Aluminum, went into operation in 1998 with an annual production of 60 thousand tons of aluminum. Current production capacity of the plant is 260 thousand tons per year after being expanded three times. The latest large scale project was the Alcoa aluminum plant, which started production in 2007 and has a production capacity of 350 thousand tons of aluminum per year.

2.6.4 Transport

The domestic transportation network consists of roads and air transportation. Private car ownership is widespread. In 2011, Iceland had 646 passenger cars per 1,000 inhabitants and ranked second highest ratio among OECD countries in 2010. Car ownership peaked in 2007 and has stabilized after 2009. The registration of new vehicles has been highly variable in the past. The sale of new vehicles collapsed in 2009 with only 2800 new registrations, which can be compared with 23000 registratins in 2006. National roads totaled 12,890 km in 2012, of which 4,930 km are classified as major roads.

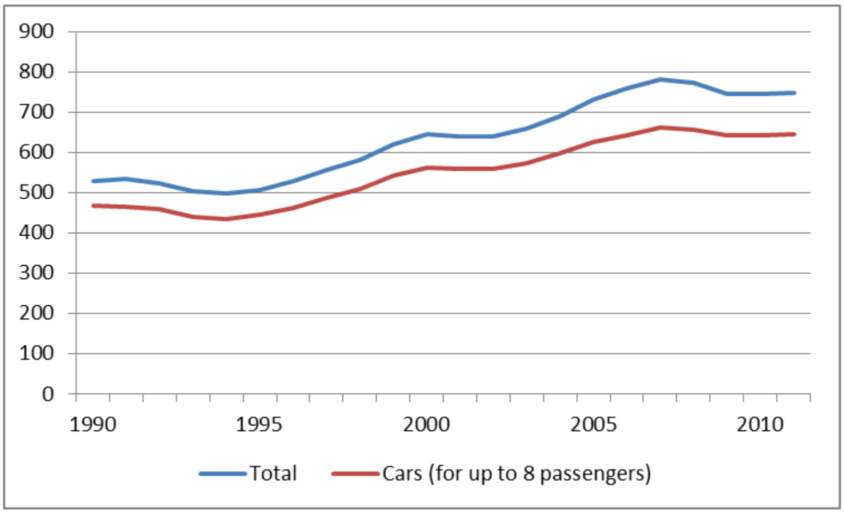

Figure 2.17 Vehicles per 1000 inhabitants 1990 - 2011

Aviation plays a key role in Iceland. The country's geographical location makes undisturbed international air transportation imperative. Domestic aviation is also important because of long travel distances within the country combined with a small population. An investment in a railway system is therefore not a viable option.

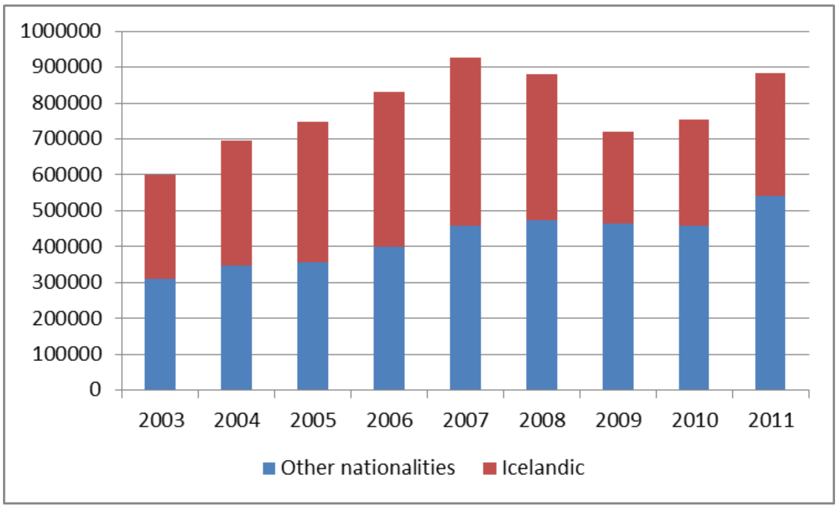

Figure 2.18 Number of passengers departing from Keflavik International Airport

International passengers in Icelandic airports equalled 2.4 million in 2012 of which 430.000 were transit passengers. Most passengers, 97.5%, passed through Keflavik International Airport. Figure 2.18 shows the number of passengers departing from Keflavik International Airport. In 2010 and 2011 the proportion of departing passengers holding Icelandic passport was 39%. The majority, 61%, were of other nationalities with a total of 540000 in 2011. In all 107.000 aircrafts entered the Reykjavík Oceanic Control Area in 2012. Of these 30.000 were flights to and from Iceland. The total of departing and arriving domestic passengers in Iceland was 750.000 in 2012 and had decreased by 3.8% from the previous year. The number of passengers on domestic flights has decreased by 4% annually since 2007.

Iceland has numerous harbors large enough to handle international ship traffic, which are free of ice throughout the year. The two main shipping lines operate regular liner services to the major ports of Europe and the US.

2.6.5 Tourism

Tourism has increased rapidly in Iceland in recent years. The number of foreigners visiting Iceland through Keflavik Airport increased by 75% from 2003 to 2011 as Figure 2.18 shows. Other points of entry to Iceland are passengers on luxury liners, with a total of 62000 entering Reykjavik harbor in 2011, and car ferries which carried around 12000 foreign passengers to Iceland in 2011. With 540000 passing through Keflavik Airport the approximate number of foreign visitors total 614000, almost twice as many as the population of Iceland.

The number of overnight stays in Iceland by all kind of accomodation establishments was 3.2 million in 2011. Of these, 2.4 million stays, or 75% of the total, were by visitors from outside Iceland.

2.6.6 Construction

In the late 1970s the number of completed residential flats and houses in Iceland lay above 2000 annually. The number decreased steadlily until 2001 when construction expanded rapidly with a peak in 2007 with 3300 houses and flats completed. This expansion coincided with major building projects, the Kárahnjúkar hydropower plant and dam and the Alcoa aluminum smelter in eastern Iceland.

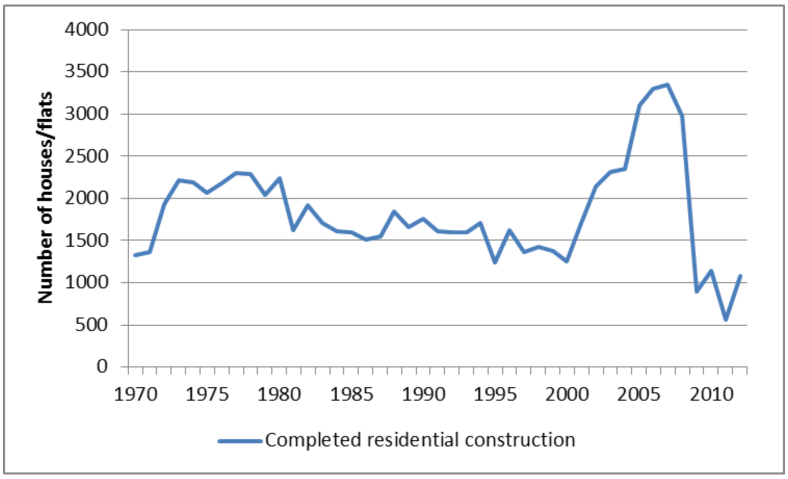

Figure 2.19 Completed residential construction

The construction industry collapsed after 2008 with a record low number of completed residences in 2011. The recession led to the closure of Iceland's only cement factory in 2012.

2.6.7 Agriculture, land management and forestry

Approximately one fifth of the total land area of Iceland is suitable for grazing and fodder production and the raising of livestock. Around 6% of this area is cultivated, with the remainder devoted to raising livestock or left undeveloped. Production of meat and dairy products is mainly for domestic consumption. The principal crops have been hay, potatoes and other root vegetables. Cultivation of other crops, such as barley and oats, has increased rapidly in the last 10 years and they are now becoming one of the staples. Vegetables and flowers are mainly cultivated in greenhouses heated with geothermal water and lit with electricity in winter.

In Iceland the human impact on ecosystems is strong. The entire island was estimated to be about 65% covered with vegetation at the time of settlement in the year 874. Today, Iceland is only about 25% vegetated. This reduction in vegetative cover is the result of a combination of harsh climate and intensive land and resource utilization by a farming and agrarian society over 11 centuries. Estimates vary as to the percentage of the island originally covered with forest and woodlands at settlement, but a range of 25 to 30% is plausible.

Organized forestry is considered to have started in Iceland in 1899. Afforestation through planting did increase considerably during the 1990s from an average of around 1 million seedlings annually in the 1980s to 4 million in the 1990s. Planting reached a high of about 6 million seedlings per year during 2007 – 2009 but was reduced after the financial crisis to about 3.5 million seedlings in 2012. Around 1100-1900 ha was afforested annually in the period of 1990-2007. Planting of native birch has been increasing proportionate to the total afforestation, comprising 24% of seedlings planted in the period 1990-2007. From its limited beginnings in 1970, state supported afforestation on farms and privately owned land has become the main channel for afforestation activity in Iceland, comprising about 80% of the afforestation effort today. The total area of forest and other wooded land is 1840 km^2 covering 1.8% of the surface of Iceland. Native birch forest and woodland cover 1460 km^2 and cultivated forest cover 380 km^2.

The Soil Conservation Service of Iceland, an agency under the Ministry for the Environment and Natural Resources, was founded in 1907. The main tasks of the agency is combating desertification, sand encroachment and other soil erosion, the promotion of sustainable land use and reclamation and restoration of degraded land. A pollen record from Iceland confirms the rapid decline of birch and the expansion of grasses in 870-900 AD, a trend that continued to the present. As early as around 1100 more than 90% of the original Icelandic forest was gone and by 1700 about 40% of the soils had been washed or blown away. Vast gravel-covered plains were created where once there was vegetated land. Ecosystem degradation is one of the largest environmental problems in Iceland. Vast areas have been desertified after over-exploitation and the speed of erosion is often magnified in certain areas by volcanic activity and harsh weather conditions.

Land reclamation activities focused in the beginning on areas in south and south west Iceland where problems of drifing sand were most evident in threathening farms and fishing villages. After World War II the reclamation effort was spread more widely but still with a focus on south Iceland. With increased resources after 1974 reclamation activity was extended to many inland locations that were prime sources of sand along major rivers or near outlets of rivers. With detailed information aquired from mapping of erosion severity, recent reclamation activity has become wider spread, more selective and targeted.

2.7 Waste

Waste management in Iceland has undergone impressive changes in the 21st century with increased separate collection of waste for recovery purposes. Mixed household waste decreased by 29% and mixed non-household waste by 49% between 2002 and 2011. These changes can be seen in Figure 2.20, which shows changes in waste per capita relative to 2002. Mixed household waste started to decline after 2007 while a rapid decline occurred in mixed non-household waste after 2004. The latter seems to have reached a plateau by 2009, while mixed household waste was still decreasing in 2011.

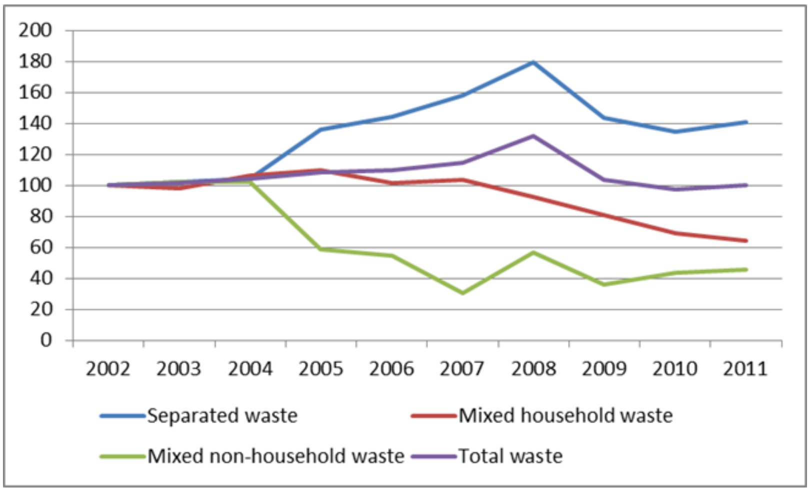

Figure 2.20 Proportional changes in the amount of waste per capita relative to 2002

Separately collected waste and total waste increased steadily with a sharp peak in 2008, after which a significant drop is seen in the amount of waste. Total waste per capita had reached the same level in 2011 as in 2002.

More separation of waste provides possibilites for waste recovery. In 2002, 73% of total waste was sent to final disposal and 27% to recovery. In 2011, the situation had reversed with 31% of waste destined for final disposal and 69% for recovery.

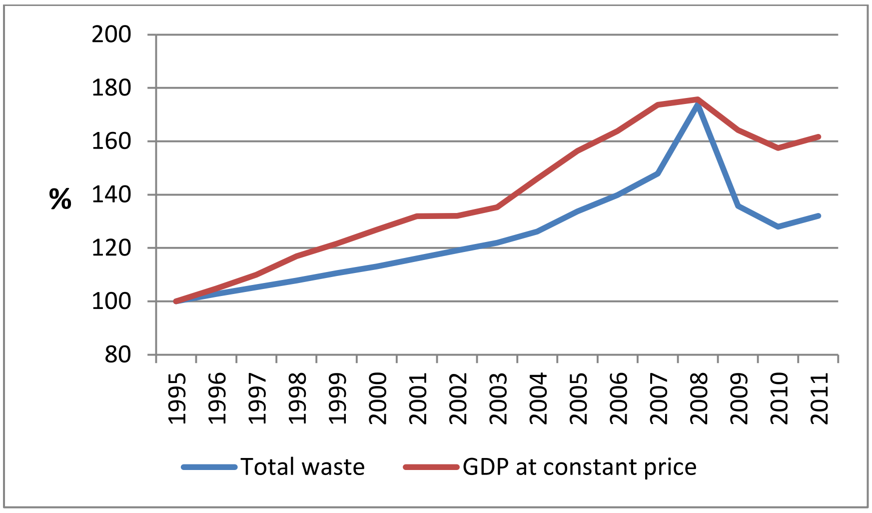

Figure 2.21 Proportional changes in total waste and GDP (fixed to 2005), in relation to 1995

Figure 2.21 shows how total amount of waste and GDP changed in the period 1995 to 2011. A steady increase is seen in both waste and GDP. In the period 1995 to 2007 both total waste and GDP increased gradually but with a more rapid growth seen in GDP, signifying a partial progressive decoupling of waste generation and GDP. The sharp peak in waste in 2008 followed by the rapid decline, which coincides with the financial crisis, reflects the lack of balance in the economy. A more rapid decline was seen in total waste than GDP in 2009, widening the gap between total waste and GDP.

About 89% of emissions from the waste sector come from solid waste disposal on land. Greenhouse gas emissions from the sector increased until 2007 with more waste being landfilled. Owing to the rapid decrease in the share of landfilled waste since 2005, a gradual decrease has been seen in emissions from the waste sector after 2007.

2.8 Other circumstances

2.8.1 Impacts of single projects on emissions, Decision 14/CP.7

The greenhouse gas emissions profile for Iceland is in many regards unusual. Three features stand out. First, emissions from the generation of electricity and from space heating are very low owing to the use of renewable energy sources. Second, more than 80% of emissions from energy come from mobile sources (transport, mobile machinery and fishing vessels). The third distinctive feature is that individual sources of industrial process emissions have a significant proportional impact on emissions at the national level. Most noticeable in this regard are abrupt increases in emissions from aluminum production associated with the expanded production capacity of this industry. This last aspect of Iceland's emission profile made it difficult to set meaningful targets for Iceland during the Kyoto Protocol negotiations.

This fact was acknowledged in Decision 1/CP.3 paragraph 5(d), which established a process for considering the issue and taking appropriate action. This process was completed with Decision 14/CP.7 on the Impact of Single Projects on Emissions in the Commitment Period.

The problem associated with the significant proportional impact of single projects on emissions is fundamentally a problem of scale. In small economies, single projects can dominate the changes in emissions from year to year. When the impact of such projects becomes several times larger than the combined effects of available greenhouse gas abatement measures, it becomes very difficult for the party involved to adopt quantified emissions limitations. It does not take a large source to strongly influence the total emissions from Iceland. A single aluminum plant can add more than 15% to the country's total greenhouse gas emissions. A plant of the same size would have negligible effect on emissions in most industrialized countries.

Decision 14/CP.7 sets a threshold for significant proportional impact of single projects at 5% of total carbon dioxide emissions of a party in 1990. Projects exceeding this threshold shall be reported separately and carbon dioxide emissions from them not included in national totals to the extent that they would cause the party to exceed its assigned amount. Iceland can therefore not transfer assigned amount units to other Parties through international emissions trading. The total amount that can be reported separately under this decision is set at 1.6 million tons of carbon dioxide. The scope of Decision 14/CP.7 is explicitly limited to small economies, defined as economies emitting less than 0.05% of the total Annex I carbon dioxide emissions in 1990. In addition to the criteria above, which relate to the fundamental problem of scale, additional criteria are included that relate to the nature of the project and the emission savings resulting from it. Only projects, where renewable energy is used, and where this use of renewable energy results in a reduction in greenhouse gas emissions per unit of production, are eligible. The use of best environmental practice and best available technology is also required. It should be underlined that the decision only applies to carbon dioxide emissions from industrial processes. Other emissions, such as energy emissions or process emissions of other gases, such as PFCs, will not be affected. Decision 14/CP.7 applies to the first commitment period of the Kyoto-protocol.

3 Greenhouse gas inventory information

3.1 Greenhouse gas emissions and trends

The total amounts of greenhouse gases emitted in Iceland in 1990, 2000, 2008, 2009, 2010 and 2011 and the contribution of individual greenhouse gases are shown in Table 3.1. Emissions fulfilling the criteria set forth in Decision 14/CP. 7 are also included. Industrial process CO_2 emissions that fulfill Decision 14/CP.7 shall be reported separately and excluded from national totals, to the extent they would cause a Party to exceed its assigned amount.

In 2011, Iceland‘s total emissions of greenhouse gases were 4,413 gigagrams of CO_2-equivalent. The emissions rose by 905 Gg CO_2-eq in 2011 compared to 1990 levels, an increase of 25.8%. Emissions of CO_2 in 2011 fulfilling the criteria in Decision 14/CP.7 were 1209 Gg CO_2-eq. The largest contribution of greenhouse gas emissions in Iceland in 2011 was from industrial processes followed in order of size by the energy sector, agriculture, waste and solvent and other product use. From 1990 to 2011, the contribution of industrial processes to the total emissions increased from 25% to 41%, while the contribution of the energy sector decreased from 51% to 40%.

Table 3.1 Emissions of greenhouse gases during 1990, 2000, 2008, 2009, 2010 and 2011 in Gg CO_2-eq

	1990	2000	2008	2009	2010	2011	Changes '90-'11	Changes '10-'11
CO_2	2160	2776	3605	3572	3432	3333	54.3%	-2.9%
CH_4	406	440	461	459	459	444	9.4%	-3.3%
N_2O	521	495	504	469	454	448	-13.9%	-1.2%
HFCs	NO	36	71	95	123	121		-1%
PFCs	420	128	349	153	146	63	-84.9%	-56.6%
CF_4	355	108	295	129	123	53	-84.9%	-56.6%
C_2F_6	65	20	54	24	22	10	-84.9%	-56.6%
SF_6	1	1	3	3	5	3	172%	-36%
Total	3508	3876	4994	4751	4618	4413	25.8%	-4.4%
CO_2 emissions fulfilling 14/CP.7			1177	1201	1229	1209		
Total emissions excluding CO2 emissions fulfilling 14/CP.7			3817	3550	3389	3204		

A main driver behind increased emissions after 1990 was an expansion in the non-ferrous metal sector. Between 1990 and 2011 the production of aluminium increased by about 9-fold and the production of ferro-silicon by 68%. Other drivers are growth in GDP and population.

Greenhouse gas emissions decreased between 1990 and 1994, mainly because reduced emissions of PFCs as a result of improved technology and process control in the aluminium industry. A decrease by 98% in the amount of PFC emitted per ton of aluminum produced was achieved in the period 1990 – 2005. By the middle of the 1990s economic growth started to gain momentum in Iceland and total emissions increased by about 5% per year with increased production of ferro-silicon and a new aluminium plant, followed by a plateau between 2000 and 2005. Building of a new aluminum plant and increased production led to increase in emissions after 2005 peaking in 2008. Increased activity in construction, e.g. a new hydropower plant, population increase, which grew by 25% between 1990 and 2011, increased GDP and growth in private car ownership contributed also to increased greenhouse gas emissions. Iceland was hit severely by a financial crisis in 2008 and emissions of greenhouse gases decreased in most sectors. The construction sector collapsed, fuel combustion emissions in the transport and construction sectors decreased by 23% in 2007 – 2011 and emissions from cement production fell by 69%. Emissions decreased on average by 4% per year in 2008 - 2011.

3.1.1 Emission trends by gas

The largest share of total GHG emissions in 2011 came from CO_2 emissions, with 76% of the total, as shown in Figure 3.1. Methane and nitrous oxide emissions contributed equally with a total of 20% of the emissions. The remaining 4% of total emissions were HFCs (2.7%), PFCs (1.4%) and SF_6 (0.07%).

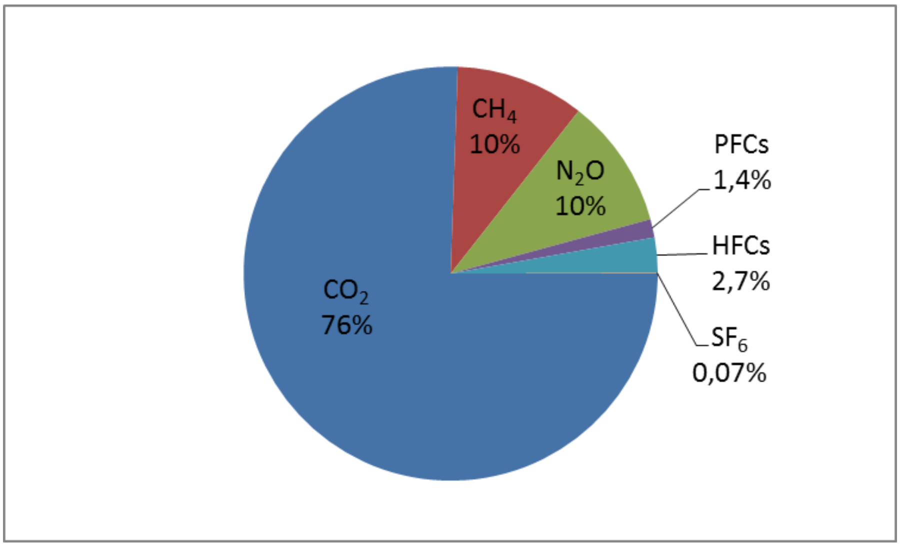

Figure 3.1 Distribution of emissions of greenhouse gases by gas in 2011

Trends in emissions of greenhouse gases in 1990 to 2011 are shown in Figure 3.2. The emissions of CO_2 increased steadily during this period until 2008 with leaps relating to startups of increased production capacity in the non-ferrous metal sector. The figure illustrates how emissions of PFCs peak when production is increased in the aluminium sector and decline when balance is reached in the production. It also illustrates the effort made in the 1990 to reduce the emissions PFCs. An increase is clearly seen in emissions of HFCs with increased use. Emissions of methane and nitrous oxide remained fairly stable throughout 1990 – 2011.

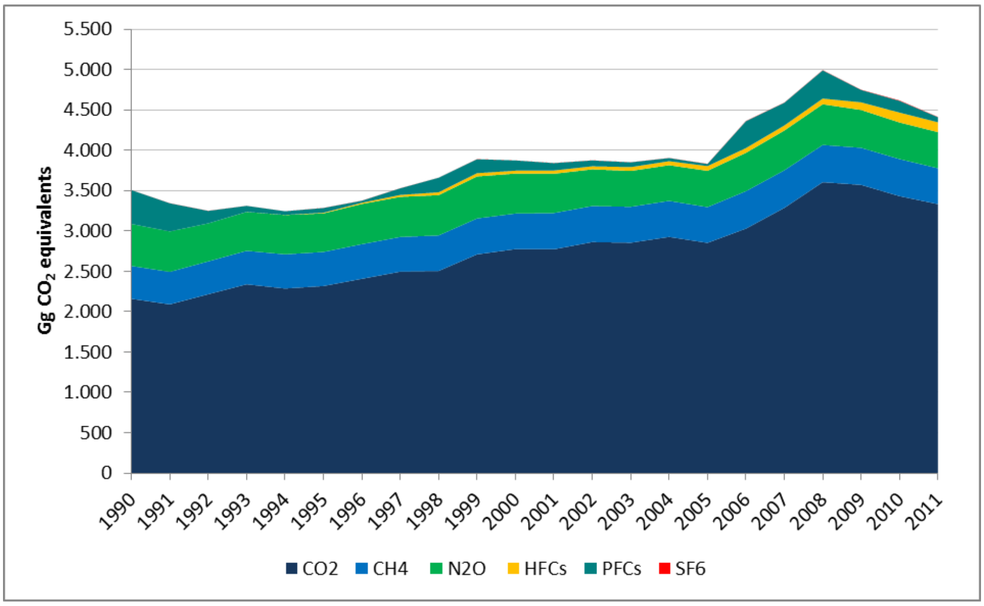

Figure 3.2 Emissions of greenhouse gases by gas 1990 – 2011

3.1.1.1 Carbon dioxide (CO_2)

The distribution of CO_2 emissions by source categories is shown in Figure 3.3 and trends in CO_2 emissions, depicted as deviations from the emissions in 1990, are shown in Figure 3.4. Emissions from industrial processes are most important contributing with almost half of total CO_2 emissions. The second largest contribution, almost a quarter of the emissions is from road transport. With fishing contributing 15%, these three main sources account for 87% of the total. . Renewable sources are almost exclusively used for generation of electricity and space heating resulting in very low emissions. Geothermal energy extraction is the source of 5% of CO_2 emissions, while contributing 67% of the gross energy consumption. Emissions from stationary combustion are dominated by industrial sources with the fishmeal industry being the primary user of fossil fuels. Emissions from mobile sources in the construction industry are also significant but decreased considerably after 2008. Emissions in the category other sources are mainly emissions from coal combustion in the cement industry, non-road transport and waste incineration.

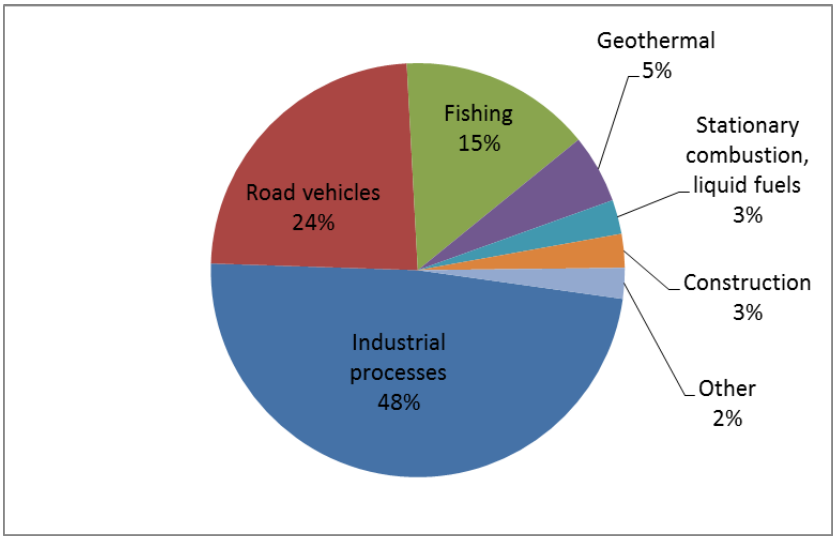

Figure 3.3 Distribution of CO_2 emissions by source in 2011

In 2011 the total CO_2 emissions in Iceland were 3,333 Gg. The emissions had declined by 2.9% from the preceding year but increased by 54% compared with 1990. The increase in CO_2 emissions between 1990 and 2011 can be explained by a fourfold increase, 1211 Gg, in emissions from industrial processes. Emissions from road transport increased by 267 Gg (51%) and emissions from geothermal energy utilisation tripled with a 118 Gg increase. Emission in 2011 had decreased from 1990 levels in fishing by 24%, stationary combustion by 73%, construction by 27% and from other emissions by 50%. Combined decrease in CO_2 emissions from these sectors amounted to 421 Gg.

During the late nineties energy intensive industrial production started to grow in Iceland. The aluminium plant and ferrosilicon facility were expanded in 1997 and 1999, and in 1998 a new aluminium plant was established. This new plant was expanded in 2006 and a third aluminium plant was established in 2007. The economic growth and the growth in energy intensive industries resulted in higher emissions from most sources, but in particular from the industrial processes sector as well as the construction sector. Emissions from the construction sector rose after 2003, but declined rapidly after the onset of the financial crisis in 2008.

The vehicle fleet in Iceland remained constant between 1990 and 1995, and then increased steadily until 2000 when the number of vehicles per 1000 inhabitants reached 562. After a downturn the registration of new vehicles rose in 2003 and peaked in 2005. New registration of vehicles collapsed in 2009. The number of vehicles per capita peaked in 2007, with 662 vehicles per 1000 inhabitants and decreased to 646 in 2011. The population of Iceland grew by 25% between 1990 and 2011. Emissions from road transport peaked in 2007 and decreased by 5% between 2007 and 2008. The emissions remained constant in 2008 and

2009 but decreased in 2010 and 2011. The emissions decreased by 7.5% between 2009 and 2011.

Emissions from fishing rose from 1990 to 1996 because a substantial portion of the fishing fleet was operating in distant fishing grounds. The emissions decreased again from 1996 reaching 1990 levels in 2001. Emissions increased again by 10% between 2001 and 2002, but in 2003 they dropped to 1990 levels. In 2011, the emissions were 24% below the 1990 levels and 6% below the 2010 levels. Annual changes in emissions reflect the inherent nature of the fishing industry.

Emissions from geothermal energy exploitation increased by 191% between 1990 and 2011. Electricity production using geothermal energy has increased during the same period from 283 GWh in 1990 to 4,701 GWh in 2011, or by more than 16-fold.

Emissions from other sources decreased from 1990 to 2003, but increased again between 2004 and 2007. The main factor was demand for cement caused by expansion in the construction industry, both residential construction and construction of the Kárahnjúkar hydropower plant. In 2011, emissions from cement production had fallen to 67% below the 2007 level because of contraction in the construction sector. Emissions from construction decreased by 14% between 2010 and 2011 and in total by 53% between 2008 and 2011.

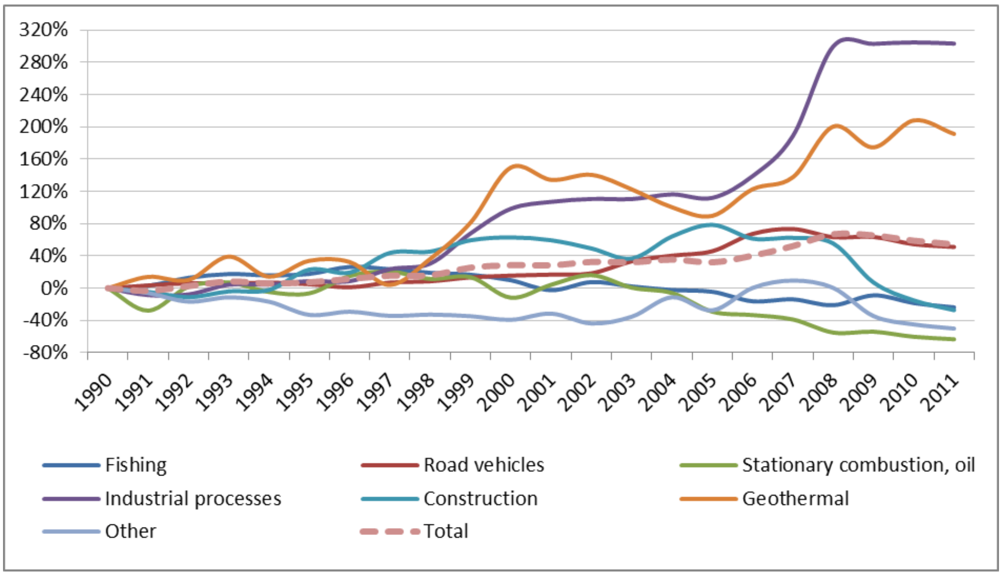

Figure 3.4 Percentage changes in emissions of CO_2 by major sources 1990 – 2011, compared with 1990

3.1.1.2 Methane (CH_4)

Agriculture and waste treatment are the principal sources of methane emissions comprising 99% of the total, as shown in Figure 3.5.

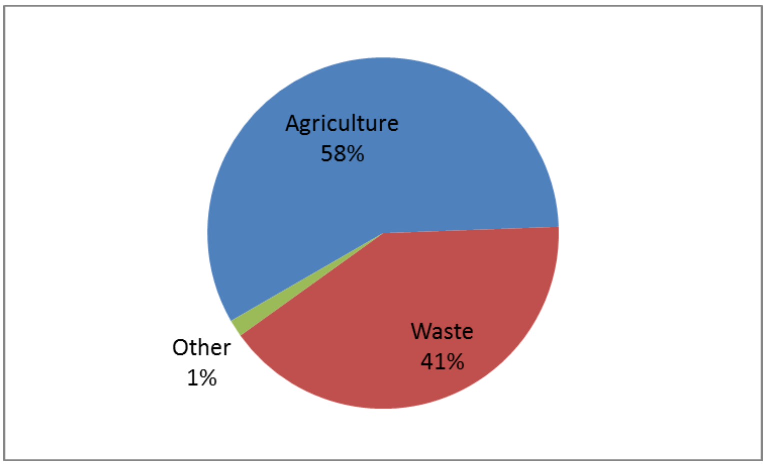

Figure 3.5 Distribution of CH_4 emissions by source in 2011

The trend in methane emissions is shown in Figure 3.6, as percentage deviation from the emissions in 1990. Methane emissions from agriculture decreased by 6% between 1990 and 2011 due to a decrease in livestock population. Emissions from waste increased by 43% during the same period. Emissions from waste treatment increased from 1990 to 2007 because of an increased share of waste being landfilled in well managed solid waste disposal sites, which have higher methane correction factors than unmanaged sites. The amount of waste being landfilled has been decreasing since 2005. The effect can be seen in decreasing emissions of methane from the waste sector since 2007.

Landfill gas is collected at Álfsnes, a solid waste disposal site which serves the capital area. Recovery started on a small scale in 1996 and increased rapidly until 2005. The recovery was lower between in 2006 - 2009 because of technical difficulties but have increased since and surpassed the 2005 recovery in 2012. The methane from the landfill is used almost exclusively as fuel for vehicles.

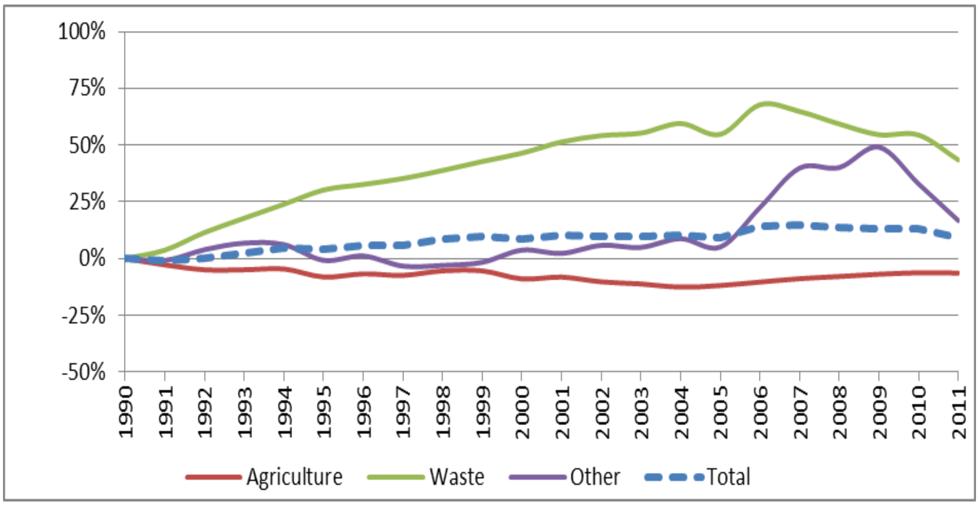

Figure 3.6 Percentage changes in emissions of CH_4 by major sources 1990 – 2011, compared to 1990

3.1.1.3 Nitrous oxide (N_20)

Agriculture accounted for 85% of N_2O emissions in 2011, as can be seen in Figure 3.7, with agricultural soils as the most prominent contributor. The second most important source is road transport, with 8% of the total.

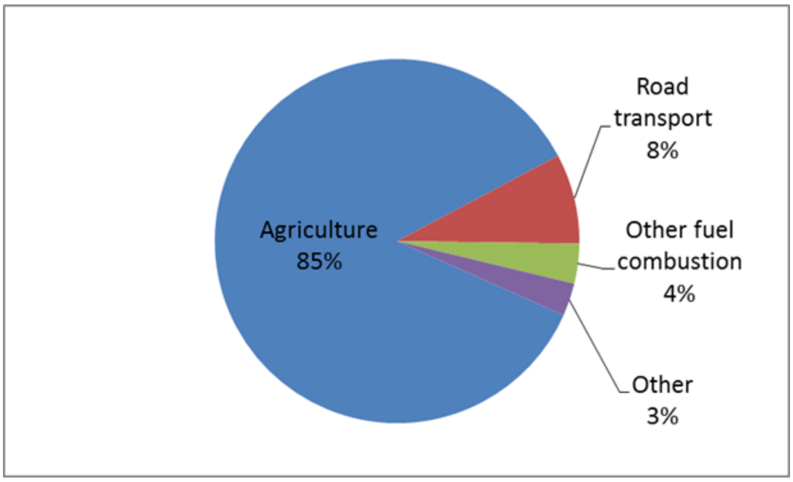

Figure 3.7 Distribution of N_2O emissions by source in 2011

The overall nitrous oxide emissions decreased by 14% from 1990 to 2011, owing to a decrease in the number of animal livestock and hence a decrease in manure production. The amount of N in synthetic fertilizer applied has been rather constant since 1990 with a temporary peak in 2008. In 2001 fertilizer production in Iceland stopped. Emissions from road transport increased rapidly after the use of catalytic converters in all new vehicles became obligatory in 1995.

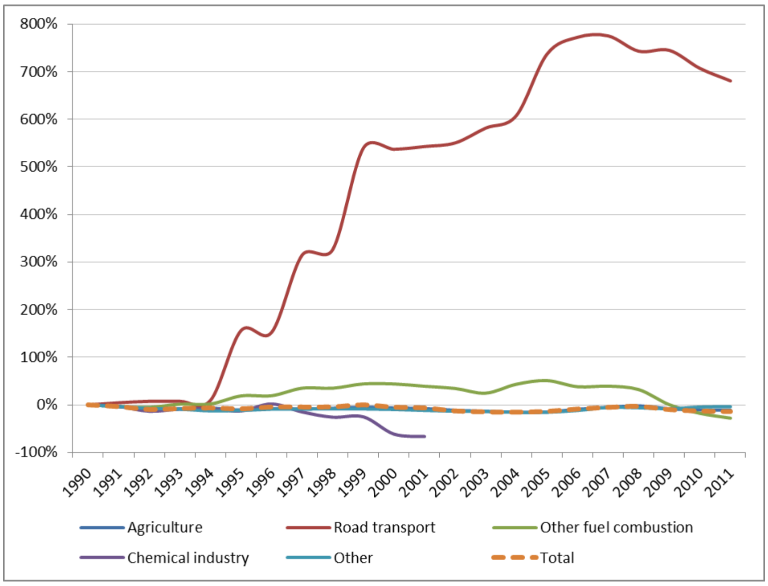

Figure 3.8. Percentage changes in emissions of N_2O by major sources 1990 – 2011, compared to 1990

3.1.1.4 Perfluorocarbons (PFCs)

The emissions of the perfluorocarbons, i.e. tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6) from the aluminium industry were 53 and 10 Gg CO_2-eq respectively in 2011. Emissions of C_3F_8 from refrigeration and air conditioning amounted to 0,0003 Gg CO_2-eq.

Total PFC emissions decreased by 85% in 1990 – 2011. The emissions decreased steeply from 1990 to 1996, increased again in 1997 and 1998 owing to an enlargement of the existing aluminium plant in 1997 and the establishment of a second new aluminium plant in 1998 (see Figure 3.9). After the start-ups of the new production facilities the emissions showed a steady downward trend until 2005. This reduction was achieved through improved technology and process control and led to a 98% decrease in PFCs emitted per tonne of aluminium produced during the period of 1990 to 2005. The new aluminium plant was enlarged in 2006 resulting in significant increase in PFC emissions. A third aluminium plant was established in 2007.The start-up phase of aluminium production in new plants or when plants are expanded usually brings increased PFC emissions per ton of aluminium. As the operation of a smelter reaches stability after the start-up the emissions gradually decrease.

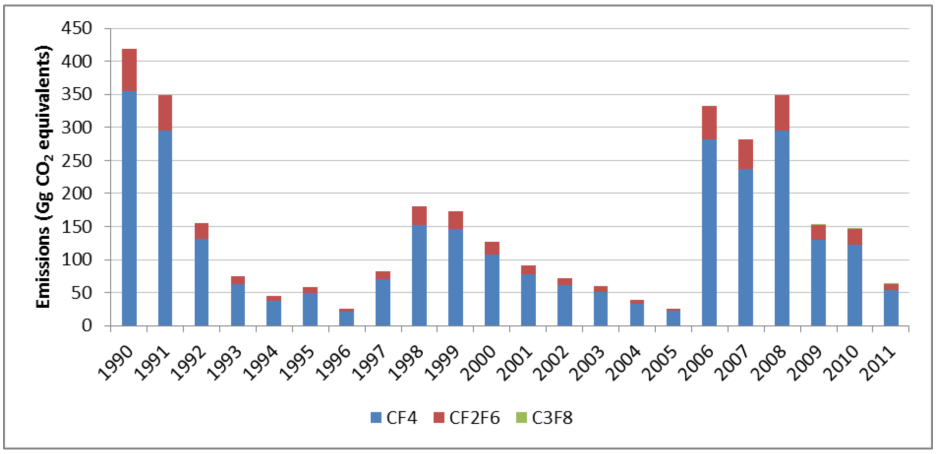

Figure 3.9 Emissions of PFCs from 1990 to 2011, Gg CO_2-equivalent

3.1.1.5 Hydrofluorocarbons (HFCs)

The total emissions of HFCs, used as substitutes for ozone depleting substances, amounted to 121 Gg CO_2-eq in 2011, accounting for 2,7% of total emissions. The emissions increased steadily until 2010 after the import of HFCs started in 1993 in response to the phase-out of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). A slight decrease in emissions is seen between 2010 and 2011, after a sharp decline in imports of HFCs in 2011. Refrigeration and air-conditioning are by far the largest sources HFCs emissions. Main applications are the fishing industry, industrial refrigeration, commercial refrigeration, and vehicle air conditioning. Ban on import of new chlorodifluoromethane (R-22) in 2010 and an impending ban on recovered R-22 created urgency in retrofitting and replacing refrigerant systems in the fishing industry, resulting in a sharp increase in imports of HFCs in 2009 and 2010.

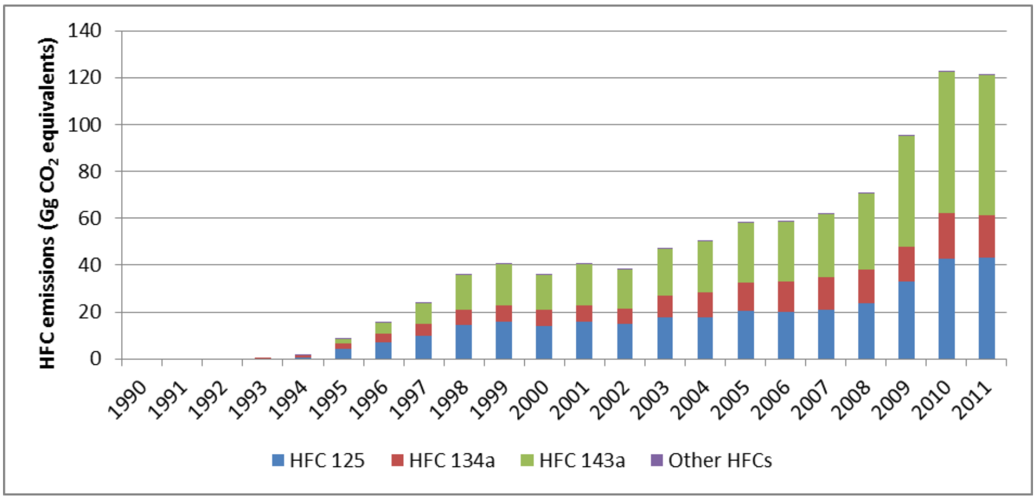

Figure 3.10 Emissions of HFCs by species 1990 – 2011, Gg CO_2-eq

3.1.1.6 Sulphur hexafluoride (SF_6)

Emissions of SF_6 in Iceland are caused by leakage from electrical equipment. In 2011 the emissions amounted to 3.1 Gg CO_2-equivalents. The emissions increased by 1.95 Gg CO_2-equivalents between 1990 and 2011. The electricity distribution system has expanded since 1990 and so has the use of high voltage equipment containing SF_6, resulting in increased emissions. The emissions of SF_6, in tons, is shown in Figure 3.11. An emission peak in 2010 was caused by two unrelated accidents during that year.

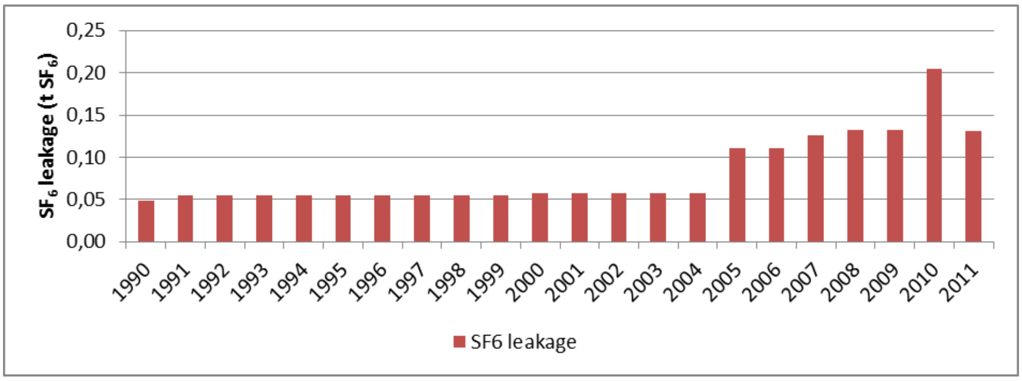

Figure 3.11 Emissions of SF_6 1990 – 2011, in tons of SF_6

3.1.2 Emission trends by source

Industrial processes were the biggest source of greenhouse gas emissions (without LULUCF) in Iceland in 2011, followed by the energy sector, agriculture, waste and solvent and other product use.

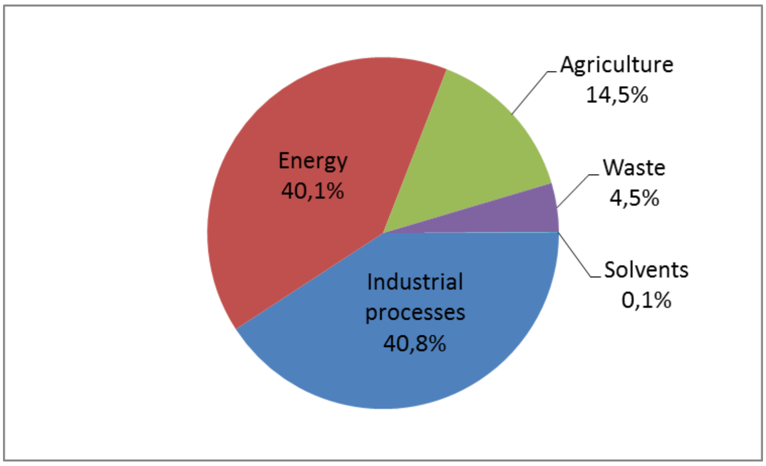

Figure 3.12 Emissions of greenhouse gases by UNFCCC sector in 2011

Annual changes in emissions from different sectors are shown in Figure 3.13. The most significant change is in industrial process emissions, which increased from 25% to 41% of total emissions (without LULUCF) between 1990 and 2011. The contribution of the energy sector decreased during the same period from 51% in 1990 to 40% in 2011, and the contribution of agriculture from 20% to 14.5%, while the waste sector increased by 0.4%.

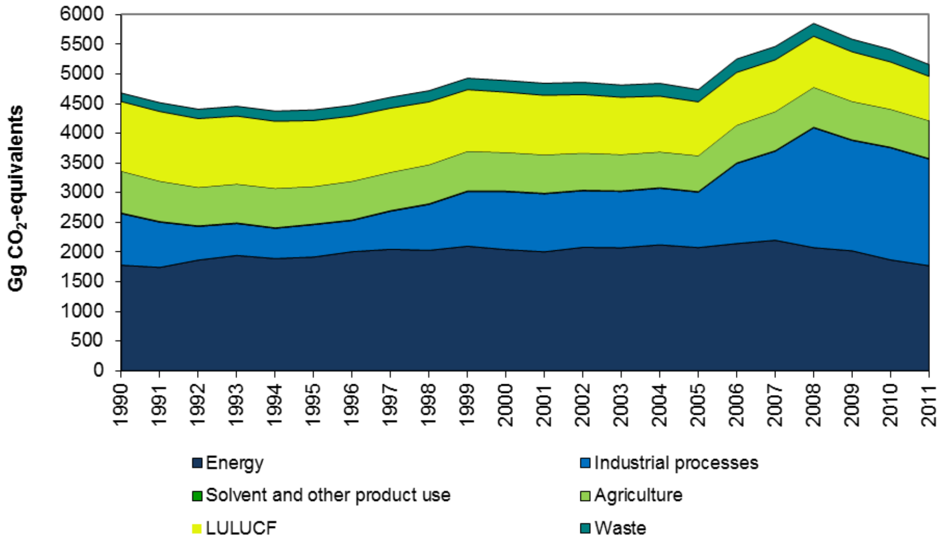

Figure 3.13 Emissions of greenhouse gases by sector 1990 – 2011, Gg CO_2-eq

3.1.3 Energy

The energy sector in Iceland is unique in many ways. In 2011 the primary energy consumption per capita was about 740 GJ, which is among the highest in the world. The proportion of domestic renewable energy in the total energy budget was 85%, which is also a much higher share than in most other countries. Energy intensive primary metal production and fisheries are major pillars of the economy and the cool climate and sparse population call for high energy use for space heating and transport. The largest part of the electricity generated, around 80%, was in 2011 used for production of non-ferrous metals. Geothermal energy sources are used for space heating and electricity production. More than 90% of homes are heated with geothermal energy. Electricity produced in Iceland comes from geothermal sources (27%) and hydroelectric power stations (73%).

Fuel combustion accounted for 90% of the emissions in the energy sector and 36% of total greenhouse gas emissions in Iceland in 2011. The emissions from the sector are primarily from transport (49%), followed by fisheries (29%) and manufacturing industries and construction (11%). Geothermal energy utilization, a non fuel-combustion source, accounted for 10% of emissions in the sector. Only 1% of the sector‘s emission can be attributed to commercial, institutional and residential fuel combustion and 0.4% to energy industries. More than 80% of emissions from the energy sector derive from mobile sources (transport, mobile machinery and fishing vessels).

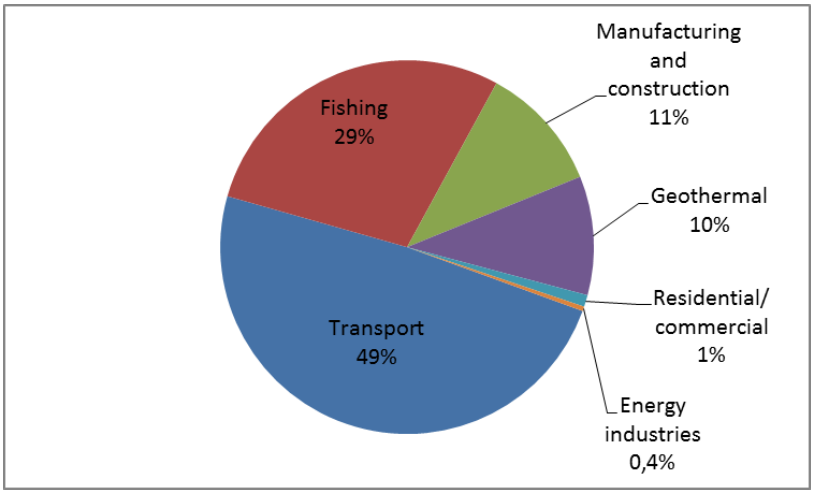

Figure 3.14 Greenhouse gas emissions in the energy sector 2011, distributed by source categories

Figure 3.15 shows how emissions from various sources in the energy sector evolved between 1990 and 2011. Emissions from the road transport accounted for 95% of emissions from transport in 2011. The emissions from road transport increased by 56% in 1990 – 2011, but because of a decline in emissions from domestic aviation and navigation emissions, less increase, 39%, was seen from the transport sector as a whole. Emissions from road transportation increased in 1990 – 2007 because of rapid growth of the vehicle fleet, more mileage driven and increased number of larger vehicle. A population increase, 25% in 1990 – 2011, is likely to have contributed to increased emissions. Emissions from road transport declined after 2007.

Emissions of greenhouse gases from fisheries (main component of “other sectors” shown in Figure 3.15) increased from 1990 to 1996 because a substantial portion of the fishing fleet was operating in unusually distant fishing grounds. From 1996, the emissions decreased again reaching 1990 levels in 2001. Emissions increased again by 10% between 2001 and 2002, but had reached 1990 levels again in 2003. In 2011 the emissions were 24% below the emissions in 1990. Annual changes in emissions reflect the inherent nature of fishing industries.

Increased activity in construction explains increased emissions from the manufacturing industries and construction category in 1990 – 2007. Production of housing increased rapidly after 2000, which coincided with a construction of a large hydropower plant in 2002 – 2007. Construction collapsed after 2008 due to the financial crisis. Emission from fuel combustion in cement production fell by 69% between 2007 and 2011. The fishmeal industry, the second most important sector within this category, has decreased owing to electrification of the process and less production. In 2011, the emission from manufacturing industries and construction were 51% of the emissions in 1990.

Electricity production using geothermal energy increased more than 16-fold in 1990 – 2011, from 283 GWh in 1990 to 4701 GWh generated in 2011. The greenhouse gas emissions in 2011 amounted to 182 Gg CO_2-eq, an increase since 1990 of 120 Gg CO_2-eq. Average per unit emissions in 2011 were consequently 0.039 Gg CO_2-eq/GWh.

Emissions from energy industries accounted for 0.4% of emissions from the energy sector in 2011 and had decreased by half in absolute numbers since 1990. These include emissionsfrom electricity and heat production in two islands off the coast in North Iceland and backup systems for electricity facilities. Uses of backup systems explain the peaks observed in Figure 3.13 in 1995, 1998 and 2007.

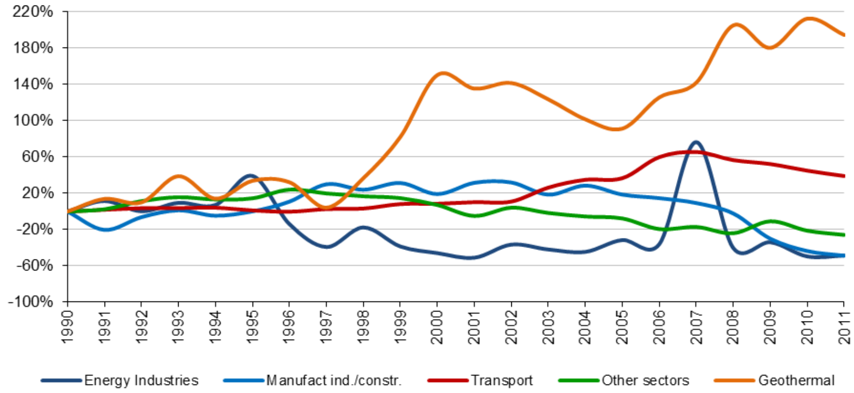

Figure 3.15 Percentage changes in emissions from source categories in the energy sector during the period 1990 – 2011, compared to 1990

3.1.4 Industrial processes

Industrial processes are the main source of greenhouse gas emissions in Iceland accounting for 41% of the total in 2011. The greenhouse gases emitted from industrial processes are primarily CO_2 and the sector is the sole contributor to emissions of PFCs. Consumption of HFCs and SF_6 within the sector leads to emissions of these gases. Production of nonferrous metals, aluminum and ferrosilicon, is the predominant source of greenhouse gas emissons within the sector accounting for 92% of the total in 2011. Production of minerals accounted for 1% of the emissions, mainly from cement production, and the remainder, 6.9%, is due to consumption of HFCs and SF_6.

Trends in emissions from major industrial processes in 1990 – 2011 are shown in Figure 3.16. The emissions decreased between 1990 and 1996 because of improvements made in technology and process control at the single aluminum smelter in operation at that time leading to steep reductions, by 94%, in emissions of PFCs (see also Figure 3.2). During the late nineties the nonferrous metals industry expanded in Iceland. The production capacity of the aluminium plant was increased in 1997 and the ferrosilicon plant was enlarged in 1999. A second aluminium plant was built and started operation in 1998. After an increase in emissions during this period emissions decreased from 2000 until 2006 when the second aluminium plant was expanded followed by the startup of a third aluminium plant in 2007 leading to increase in emissions, which peaked in 2008 .

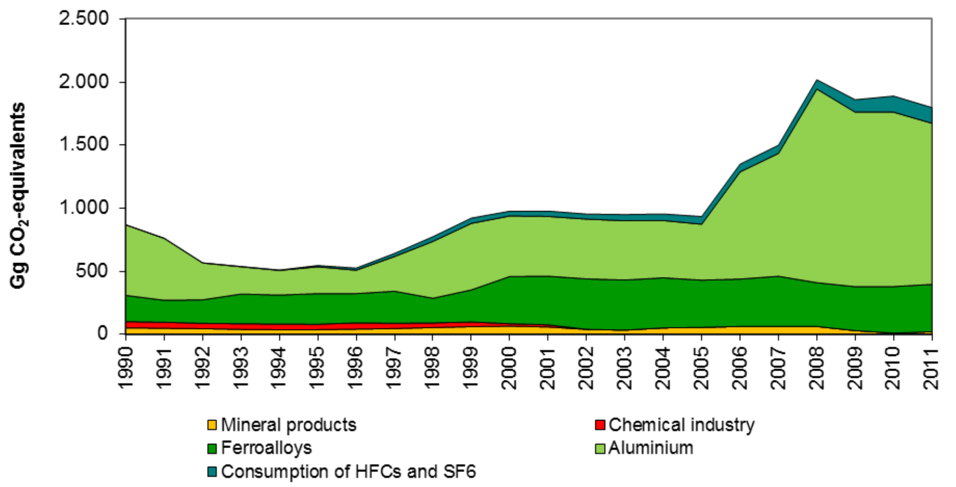

Figure 3.16 Total greenhouse gas emissions in the industrial process sector during the period from 1990 – 2011, Gg CO_2-eq

The most significant part of the greenhouse gas emissions from industrial processes, i.e. 71% could be attributed to primary aluminium production in 2011. These emissions are primarily CO_2, released in the electrolysis process by oxidation of the carbon anodes. The use of carbon anodes is inherent in the Hall-Héroult process that is employed for producing aluminium. The CO_2 released is about 1.5 tons for each ton of aluminium produced. Possibilities of reducing these releases per ton of aluminium are limited beyond applying the prebake technology and process control classified as best available techniques, which are currently used in the aluminium smelters in Iceland.

PFC emissions are also significant in the aluminium industry. The PFCs, tetrofluormethane (CF_4) and hexofluormethane (C_2F_6), are formed during so called anode effects, caused by disturbances in the electrolysis process. Major effort was made after 1990 to lower the frequency and length of the anode effects resulting in 94% reduction of emissions of PFCs from 1990 to 1995. The emissions, per ton of aluminium, were reduced from 4.78 tons CO_2-eq in 1990 to 0.10 CO_2-eq in 2005. When new aluminium plants or new sections of existing plants are taken into use the emissions of PFCs usually increase before the operation of the new electrolytic cells becomes stable. This has also been the case during the expansion of the industry in Iceland and can be clearly seen in Figure 3.2, which shows a peak in PFC emissions in 1998 followed by a steady decrease until the start-up of new production capacity in 2006.

Production of ferrosilicon is the second major source of emissions from industrial processes, accounting for 21% of the emissions in 2011. Production of ferrosilicon leads to emissions of CO_2 from the use of coal and coke as reducing agents and oxidation of carbon electrodesThe ferrosilicon plant was expanded in 1999 and CO_2 emissions increased accordingly.

Cement production is the dominant contributor to greenhouse gas emissions in the category production of minerals. Cement was produced in one plant in Iceland, emitting CO_2 derived from carbon in the shell sand used as the raw material in the process. Emissions from the cement industry peaked in 2000 but declined thereafter until 2003, partly because of cement imports. In 2004 - 2007 the emissions increased again because of increased activity related to the construction of a new hydropower plant. The emissions declined by 69% between 2007 and 2011. The emissions accounted for 1.1% of the emissions from industrial processes in 2011.

Production of fertilizers, which used to be the main contributor to the process emissions from the chemical industry, was closed down in 2001. No chemical industry has been in operation in Iceland after diatomite processing in North-Iceland was suspended in 2004.

Imports of HFCs started in 1993 and have increased steadily since then. HFCs are used as substitutes for ozone depleting substances that are being phased out in accordance with the Montreal Protocol. Refrigeration and air conditioning are the main uses of HFCs in Iceland and the fishing industry plays a preeminent role. HFCs stored in refrigeration units constitute banks of refrigerants which emit HFCs during use due to leakage. The process of retrofitting older refrigeration systems and replacing ozone depleting substances as refrigerants is still on-going which means that the size of the refrigerant bank is increasing. The amount of HFCs emitted by mobile air conditioning units in vehicles has also increased steadily. The sole source of SF_6 emissions is leakage from electrical equipment.

3.1.5 Agriculture

Greenhouse gas emissions from agriculture in Iceland consist of methane and nitrous oxide. Direct and indirect nitrous oxide emissions from agricultural soils, and nitrous oxide emissions from pasture and range manure accounted for 53% of agricultural emissions in 2011. Metane emissions from enteric fermentation and methane and nitrous oxide emissions from manure management accounted for the remaining 47% of the emissions.

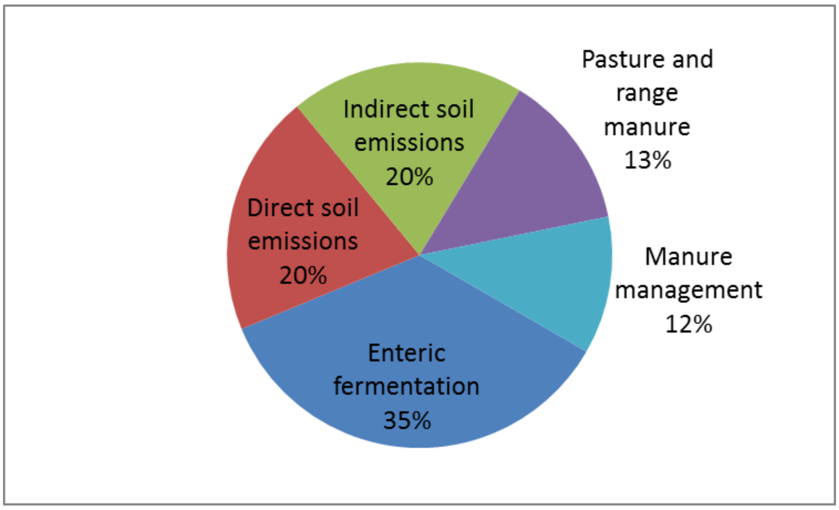

Figure 3.17 Greenhouse gas emissions in the agriculture sector 2011

The emissions over the period 1990 - 2011 were relatively stable at levels between 600 and 700 Gg CO_2-eq/yr, as can be seen in Figure 3.15. The emissions are closely coupled with livestock population sizes, especially cattle and sheep. Since emission factors are assumed to be stable changes in activity data translate into proportional emission changes. A decrease in livestock population size of sheep by 17% between 1990 and 2005 – partly counteracted by increases of livestock population sizes of horses, swine, and poultry, resulted in a 13% decrease of total agriculture emissions during the same period. Emissions from agriculture increased by 5% between 2005 and 2011 due to an increase in livestock population size but remained 9% below 1990 levels in 2011. Another factor with impact on emission estimates is the amount of nitrogen in fertilizer applied annually to agricultural soils. The amount of synthetic nitrogen applied to agricultural soil peaked in 2008, with 15300 tons applied. The amount has decreased since and was down to 10400 tons in 2011.

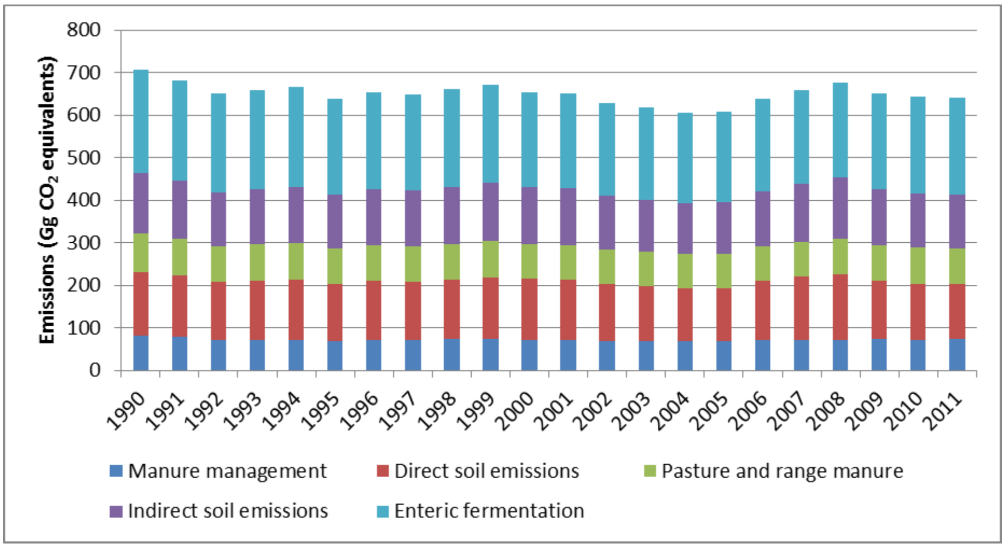

Figure 3.18 Total greenhouse gas emissions from agriculture 1990 – 2011, Gg CO_2-eq

3.1.6 Waste

Greenhouse gas emissions attributed to waste amounted for less than 5% of Iceland's total emissions in 2011. These emissions were mainly methane generated in landfills (89%). Wastewater treatment accounted for 6% of the emissions, incineration for 4% and the remaining 1% from biological treatment of waste, i.e. composting.

Trends in the emissions are shown in Figure 3.19. The emissions increased steadily between 1990 and 2007 because of accumulation of degradable organic carbon in recently established managed, anaerobic solid waste disposal sites. These have a higher methane production potential than the unmanaged solid waste disposal sites they succeeded. The share of waste being landfilled decreased rapidly from 2005 which translates into decrease in emissions from the waste sector since 2007. Recovery of methane decreases SWD emissions. The recovered methane amount peaked in 2005 which caused drop in emissions during that year.

Emissions from waste incineration decreased by half between 1990 and 2011 because of decrease in the total amount of waste being incinerated and a change in waste incineration technology. In the early 1990s waste was burned in open pits or in waste incinerators at low or varying temperatures. These have been replaced by waste incinerators with controlled combustion temperatures, with lower emissions of methane and nitrous oxides per amount of waste. Emissions from wastewater handling increased by 51% between 1990 and 2011 caused by methane from increased share of wastewater treated in septic systems and increase in nitrous oxides proportional to increased population.

Composting of waste started in Iceland in 1995. Emissions from composting have increased and followed the amounts of waste composted.

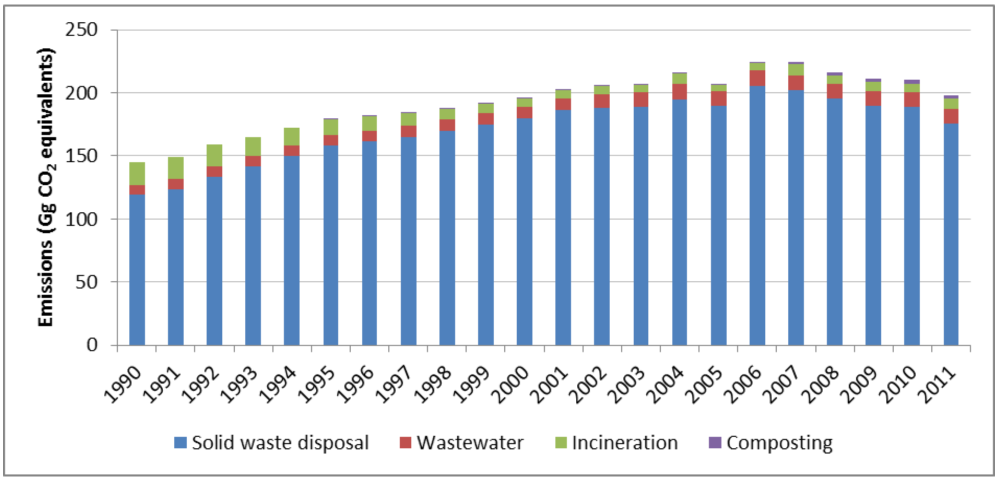

Figure 3.19 Emissions of greenhouse gases in the waste sector 1990 – 2011, Gg CO_2-eq

3.2 Greenhouse gas inventory system

3.2.1 Institutional arrangements

Act No. 70/2012 establishes the national system for the estimation of greenhouse gas emissions by sources and removals by sinks, a national registry, emission permits and establishes the legal basis for installations and aviation operators participating in the EU ETS.

Iceland's greenhouse gas inventory is addressed in Chapter III, Article 6 of Act No. 70/2012. The Envionment Agency of Iceland (EA) is designated as the responsible authority for the national accounting and the inventory of emissions and removals of greenhouse gases according to Iceland's international obligations. The Environment Agency compiles Iceland's greenhouse gas inventory. Main data suppliers are listed and the type of information they are responsible for collecting and reporting to the Environment Agency:

Soil Conservation Service of Iceland (SCSI)
Iceland Forest Service (IFS)
National Energy Authority (NEA)
Agricultural University of Iceland (AUI)
Iceland Food and Veterinary Authority
Statistics Iceland
The Road Traffic Directorate
The Icelandic Recycling Fund
Directorate of Customs

A regulation shall be set according to the Act on the reporting of information for the inventory, which *inter alia* specifies the format and deadlines for delivering information. The new regulation will formalize cooperation and the data collection process and replace a role that a Coordinating Team had with regard to cooperation between different entities.

The Environment Agency of Iceland carries the overall responsibility for the national inventory and finalizing the inventory reports. The flow of information and allocation of responsibilities is illustrated in Figure 3.17.

The contact person at the Environment Agency of Iceland is:

Christoph Wöll
Environment Agency of Iceland
Suðurlandsbraut 24
IS-108 Reykjavík
Iceland

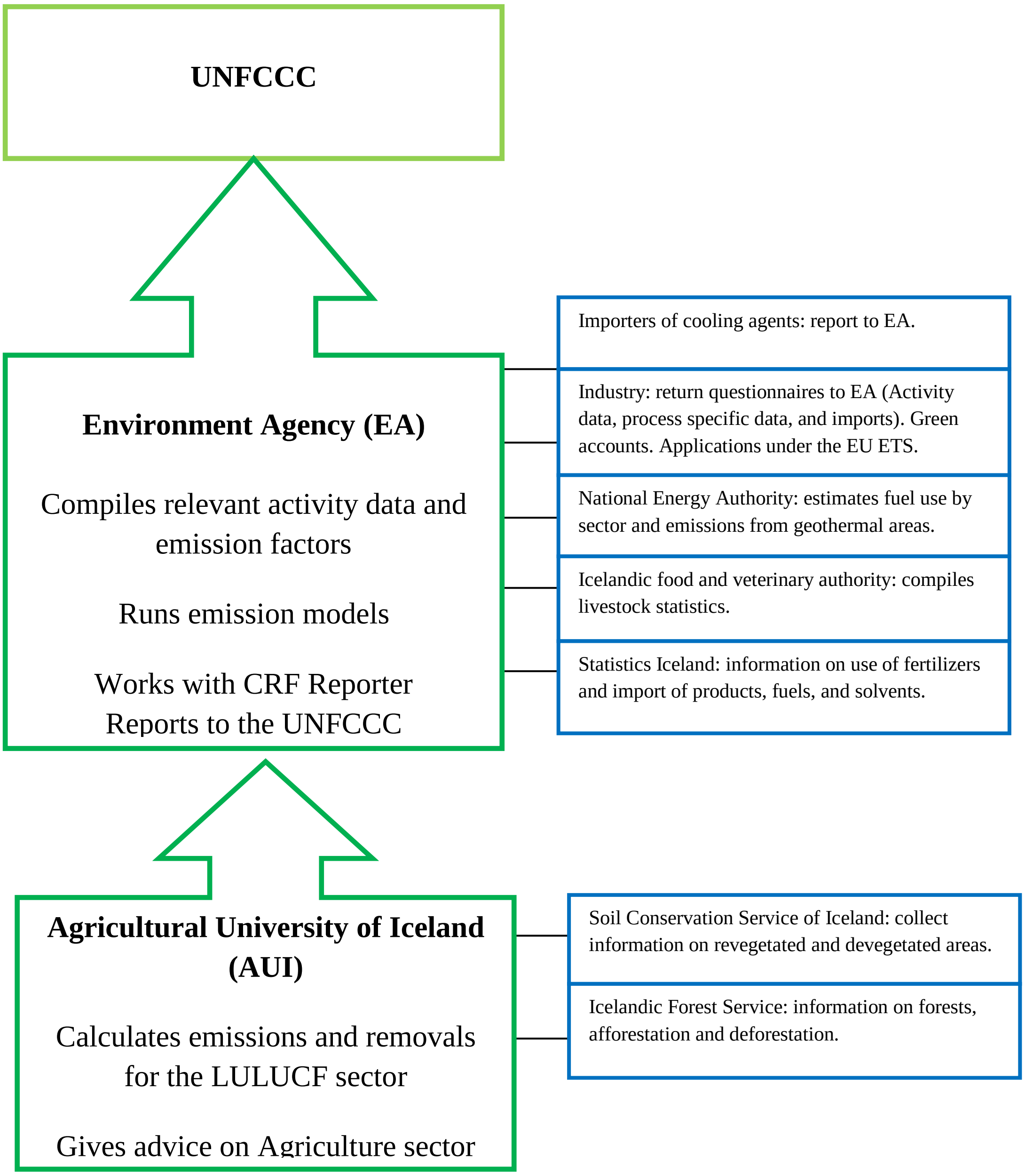

Figure 3.20 National system for the greenhouse gas inventory

3.2.2 Inventory process

The Environment Agency of Iceland collects the bulk of data necessary to run the general emission model, i.e. activity data and emission factors. Activity data is collected from various institutions and companies, as well as directly by the EA.

The National Energy Authority (NEA) collects annual information on fuel sales from the oil companies. This information was provided on an informal basis until 2008. In 2007, new legislation, Act No. 48/2007 went into force, enabling the NEA to obtain sales statistics from the oil companies.

The Farmers Association of Iceland (FAI), on behalf of the Ministry of Agriculture, was responsible for assessing the size of the animal population each year until 2011 when the Food and Veterinary Authority took over that responsibility. On request from the EA, the FAI assisted in developing a method to account for young animals that are mostly excluded from national statistics on animal population.

Statistics Iceland provides information on population, GDP, production of asphalt, food and beverages, imports of solvents and other products, the import of fertilizers and on the import and export of fuels. The EA collects various additional data directly.

Annually an electronic questionnaire on imports, use of feedstock, and production and process specific information is sent out to industrial producers, in accordance with regulation No. 244/2009. Green Accounts, submitted from the industry under regulation no. 851/2002, on green accounting, are also used for the inventory. Data in applications for free allowances under the EU ETS is also used.

Importers of HFCs submit reports on their annual imports by type of HFCs to the EA. The EA also estimates activity data with regard to waste.

Emission factors are taken mainly from the revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, IPCC Good Practice Guidance, IPCCC Good Practice Guidance for LULUCF, and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, since limited information is available from measurements of emissions in Iceland.

The Agricultural University of Iceland (AUI) receives information on revegetated areas from the Soil Conservation Service of Iceland and information on forests and afforestation from the Icelandic Forest Service. The AUI assesses other land use categories on the basis of its own geographical database and other available supplementary land use information. The AUI then calculates emissions and removals for the LULUCF sector and reports to the EA.

3.2.3 Quality Assurance and Quality Control (QA/QC)

The objective of QA/QC activities in national greenhouse gas inventories is to improve transparency, consistency, comparability, completeness, accuracy, confidence and timeliness. A

QA/QC plan for the annual greenhouse gas inventory of Iceland has been prepared and can be found at http://ust.is/library/Skrar/Atvinnulif/Loftslagsbreytingar/Iceland_QAQC_plan.pdf. The document describes the quality assurance and quality control programme. It includes the quality objectives and an inventory quality assurance and quality control plan. It also describes the responsibilities and the time schedule for the performance of QA/QC procedures. The QC activities include general methods such as accuracy checks on data acquisition and calculations and the use of approved standardised procedures for emission calculations, measurements, estimating uncertainties, archiving information and reporting. Source category specific QC measures have been developed for several key source categories.

A quality manual for the Icelandic emission inventory has been prepared (http://ust.is/library/Skrar/Atvinnulif/Loftslagsbreytingar/Iceland_QAQC_manual.pdf). To further facilitate the QA/QC procedures all calculation sheets have been revised. They include a brief description of the method used. They are also provided with colour codes for major activity data entries and emissions results to allow immediate visible recognition of outliers.

3.2.4 Uncertainty Evaluation

Uncertainty estimates are an essential element of a greenhouse gas inventory used to help prioritise efforts to improve the accuracy of the inventory. The uncertainty analysis in the National Inventory Report is according to the Tier 1 method of the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories where different gases are reviewed separately as CO_2-equivalents. Total base and current years´ emissions within a greenhouse gas sector, category or subcategory are used in the calculations as well as corresponding uncertainty estimate values for activity data and emission factors used in emission calculations.

Uncertainties are estimated for all greenhouse gas sources and sink categories (i.e. including LULUCF) according to the IPCC Good Practice Guidance. Estimates for activity data uncertainties are mainly based on expert judgement whereas emission factor uncertainties are mainly based on IPCC source category defaults. Activity data and emission factor uncertainty estimates for the Agriculture, Waste, and Solvents sectors as well as for consumption of HFCs and SF_6 were reviewed in the 2013 submission. All source category uncertainties were first weighted with 2011 emission estimates and then summarized using error propagation. Uncertainty estimates introduced on the trend of greenhouse gas emission estimates by uncertainties in activity data and emission factors are combined and then summarized by error propagation to obtain the total uncertainty of the trend.

3.2.5 The annual inventory cycle

The annual inventory cycle (Figure 3.21) describes individual activities performed each year in preparation for next submission of the emission estimates.

A new annual cycle begins with an initial planning of activities for the inventory cycle by the inventory team and major data providers as needed (NEA, AUI, IFS and SCSI), taking into account the outcome of the internal and external review as well as the recommendations from the UNFCCC review. The initial planning is followed by a period assigned for compilation of the national inventory and improvement of the National System.

After compilation of activity data, emission estimates and uncertainties are calculated and quality checks performed to validate results. Emission data is received from the sectoral expert for LULUCF. All emission estimates are imported into the CRF Reporter software.

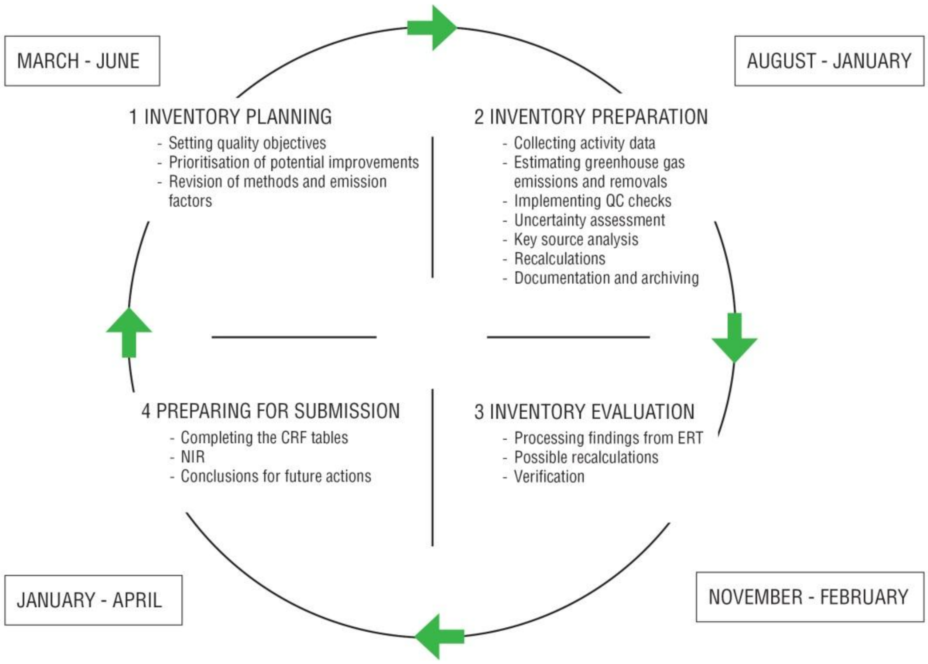

Figure 3.21 The annual inventory cycle

A series of internal review activities are carried out annually to detect and rectify any anomalies in the estimates, e.g. time series variations, with priority given to emissions from industrial plants falling under Decision 14/CP.7, other key source categories and for those categories where data and methodological changes have recently occurred.

After an approval by the director and the inventory team at the EA, the greenhouse gas inventory is submitted to the UNFCCC by the EA.

3.2.6 Document and data storage

GoPro, a document management system running on a Lotus Domino server, is used to store email communications concerning the GHG inventory. Paper documents, e.g. written letters, are scanned and also stored in GoPro. Numerical data, calculations and other related documents are stored on a Windows 2003 file server. Both the Lotus Domino server and the Windows 2003 server are running as Vmware virtual machines on Dell Blade Servers. These servers are hosted by an external IT company called Advania and their server room is located elsewhere in Reykjavik. Daily backups are taken of all the servers and separate copies of the backups are stored off-site in a neighbouring town called Hafnarfjordur. Hard copies of all references listed in the NIR are stored in the EA. The archiving process has improved over the last years, i.e. the origin of data dating years back cannot always be found out. The land use database IGLUD is stored on a server of the Agricultural University of Iceland (AUI). All other data used in LULUCF as well as spread sheets containing calculations are stored there as well. This excludes data regarding Forestry and Revegetation which is stored on servers of the Icelandic Forestry Service and Soil Conservation Service of Iceland, respectively.

3.2.7 Methodologies and data sources

The estimation methods of all greenhouse gases are harmonized with the IPCC Guidelines for National Greenhouse Gas Inventories and are in accordance with IPCC's Good Practice Guidance.

The general emission model is based on the equation:

Emission (E) = Activity level (A) * Emission Factor (EF)

The model includes the greenhouse gases and in addition the precursors and indirect greenhouse gases NOx, SO_2, NMVOC and CO, as well as some other pollutants (POPs).

3.2.8 Key source categories

According to IPCC definition, a key source category is one that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both. In the Icelandic Emission Inventory key source categories are identified by means of the Tier 1 method.

The results of the key source analysis prepared for the 2013 submission are shown in Table 3.2. The key source analysis includes LULUCF greenhouse gas sources and sinks.

Table 3.2 Key source categories of Iceland´s 2013 GHG inventory

IPCC source category			Level 1990	Level 2011	Trend
1. Energy					
1.AA.1	Public electricity and heat production	CH_4			
1.AA.1	Public electricity and heat production	CO_2			
1.AA.1	Public electricity and heat production	N_2O			
1.AA.2	Manufacturing industry and construction	CH_4			
1.AA.2	Manufacturing industry and construction	CO_2	□	□	□
1.AA.2	Manufacturing industry and construction	N_2O			
1.AA.3a/d	Transport	CH_4			
1.AA.3a/d	Transport	CO_2	□		□
1.AA.3a/d	Transport	N_2O			
1.AA.3b	Road transport	CH_4			
1.AA.3b	Road transport	CO_2	□	□	□
1.AA.3b	Road transport	N_2O			□
1.AA.4a/b	Residential/institutional/commercial	CH_4			
1.AA.4a/b	Residential/institutional/commercial	CO_2			
1.AA.4a/b	Residential/institutional/commercial	N_2O			
1.AA.4c	Fishing	CH_4			
1.AA.4c	Fishing	CO_2	□	□	□
1.AA.4c	Fishing	N_2O			
1.B.2	Geothermal energy	CH_4			
1.B.2	Geothermal energy	CO_2	□	□	□
2. Industrial Processes					
2.A	Mineral production	CO_2	□		□
2.B	Chemical industry	CO_2			
2.B	Chemical industry	N_2O	□		
2.C	Metal production	CH_4			
Table 3.2 continued					

IPCC source category			Level 1990	Level 2011	Trend
2.C.2	Ferroalloys	CO_2	□	□	□
2.C.3	Aluminium	CO_2	□	□	□
2.C.3	Aluminium	PFC	□	□	□
2.F	Consumption of halocarbons and SF6, refrigeration	HFC		□	□
2.F	Consumption of halocarbons and SF6, refrigeration	PFC			
2.F	Consumption of halocarbons and SF6, electrical	SF_6			
3. Solvents and Other Product Use					
3	Solvent and other product use	CO_2			
3	Solvent and other product use	N_2O			
4. Agriculture					
4.A.1	Enteric fermentation, cattle	CH_4	□	□	
4.A.3	Enteric fermentation, sheep	CH_4	□	□	□
4.A.4-10	Enteric fermentation, rest	CH_4			
4.B	Manure management	CH_4			
4.B	Manure management	N_2O	□	□	
4.D.1	Direct soil emissions	N_2O	□	□	□
4.D.2	Animal production	N_2O	□	□	
4.D.3	Indirect soil emissions	N_2O	□	□	
5. Land use, Land use change and Forestry					
5.A	Forest land - Afforestation	CO_2		□	□
5.A	Forest land - Natural birch forest	CO_2		□	
5.A	Forest land - Afforestation	N_2O			
5.B.1	Cropland remaining Cropland	CO_2	□	□	□
5.B.2	Land converted to Cropland	CO_2	□	□	□
5.C.1	Wetland drained for more than 20 years	CO_2	□	□	□
5.C.1	All other remaining Grassland	CO_2			
Table 3.2 continued					

IPCC source category			Level 1990	Level 2011	Trend
5.C.1	Grassland remaining grassland, biomass burning	CO_2			
5.C.1	Grassland remaining grassland, biomass burning	CH_4			
5.C.2.1-4	All other conversion to Grassland	CO_2	□	□	□
5.C.2.5	Other land converted to Grassland, revegetation	CO_2	□	□	□
5.D	Wetlands	CH_4			
5.D	Wetlands	CO_2			
5.D	Wetlands	N_2O			
5.E.2.1	Settlements	CO_2			
5.G	Grassland non CO_2-emissions	N_2O	□	□	
6. Waste					
6.A.1	Managed waste disposal on land	CH_4		□	□
6.A2	Unmanaged waste disposal sites	CH_4	□		□
6.B	Wastewater handling	CH_4			
6.B	Wastewater handling	N_2O			
6.C	Waste incineration	CH_4			
6.C	Waste incineration	CO_2			
6.C	Waste incineration	N_2O			
6.D	Other (composting)	CH_4			
6.D	Other (composting)	N_2O			

3.2.9 National registry/Union Registry

The Union Registry has replaced Member States' national registries. The Union Registry is an online database that holds accounts for stationary installations which have been transferred from national registries, as well as accounts for aircraft operators, which have been included in the European Union Emissions Trading System (EU ETS) since January 2012.

The Union Registry is a forum where companies and individuals can establish accounts to hold allowances, issued according to the ETS Directive 2009/29/EC amending Directive 2003/87/EC. Operators that fall under the scope of the Directive are required to establish an operator holding account from which they can surrender allowances to fulfill their obligations regarding emissions. The Union Registry works in a similar way as an online banking system does as companies and individuals can transfer allowances between them according to purchase agreements. Companies and individuals that have not received allocation according to the above mentioned directive can acquire allowances through auctions, exchanges or from owners of allowances through over the counter trade.

The revised ETS Directive adopted in 2009 provides for the centralisation of the ETS operations into a single European Union Registry. Iceland has been a member of the Union Registry since 2012 and the Icelandic part of the Union Registry is managed according to Comission Regulation (EU) No 389/2013 of 2 May 2013.

3.2.9.1 Implementing and running the registry system

Each Member State in the Union Registry has a national administrator who is in charge of collecting and verifying all supporting documentation as well as opening the registry accounts. The Icelandic national administrator is the Environment Agency of Iceland.

The application process involves a procedure at the Union registry's website as well as delivery of documents to the Environment Agency.

3.2.9.2 Contact details of registry administrators

Institution	Environment Agency of Iceland
Contact	ETS Registry
Address	Sudurlandsbraut 24, IS-108 Reykjavik, Iceland
Telephone	+354 591 2000
Fax	+354 591 2020
Administrators	Kristján Andrésson (kristjan@registry.ust.is) Vanda Hellsing (vanda@registry.ust.is)

3.2.9.3 Fees

Applicants need to pay opening account fees along with annual fees and the Environment Agency of Iceland does not open an account until all relevant fees have been paid. In 2013 the account establishment fee was the same as the annual fee, 37.500 ISK. The Environment Agency of Iceland has the right to change the fees.

The annual fee for an account is calculated from the date when the account is created. The annual fee collected shall be multiplied by X/365, where X represents the number of days remaining in the year when the account is created.

3.2.9.4 Documentation

When applying for an account in the Icelandic part of the Union Registry the following document must be submitted to the Environment Agency of Iceland.

- **Legal entity documents**

1. Power of Attorney form, appointing your Authorised Representatives and Additional Authorised Representatives (optional). The form must be signed by a beneficial owner or a listed director of the Legal Entity.
2. Copy of document proving the registration of the Legal Entity, e.g. Certificate of Incorporation.
3. List of beneficial owners of the Legal Entity (those who own more than 25% of the legal entity's shares or voting rights).
4. List of directors of the Legal Entity.

- **Authorized representative documents**

1. Criminal record
2. Affidavit declaration
3. Statement
4. Proof of identity, this may be a copy of one of the following
    a) a passport
    b) an identity card issued by a state that is a member of the European Economic Area or the Organisation for Economic Cooperation and Development
5. Proof of permanent address, this may be a copy of one of the following
    a) the identity document submitted under point 4(b), if it contains the address of the permanent residence
    b) any other government-issued identity document that contains the address of permanent residence
    c) if the country of permanent residence does not issue identity documents that contain the address of permanent residence, a statement from the local authorities confirming the nominee's permanent residence

All copies of documents submitted as evidence must be certified as a true copy by a Notary Public. If documents are issued outside Iceland, the copy must be Apostilled. The date of the certification or Apostille must not be more than three months prior to the date of the application.

All application documents submitted shall be in English or Icelandic. If the original document is in another language the documents must be accompanied with a certified translation to English or Icelandic.

3.2.9.5 Compliance with EU ETS rules

The European Union Transaction Log (EUTL) automatically checks, records, and authorises all transactions that take place between accounts in the Union Registry. This verification ensures that any transfer of allowances from one account to another is consistent with EU ETS rules.

The EUTL is the successor of the Community Independent Transaction Log (CITL), which had a similar role before the activation of the Union registry.

3.2.9.6 Security of the Union Registry

Administrators and users are granted access through a web interface with usernames and passwords. When logging into the Union Registry a sms verification code is sent to the user's mobile phone and the code needs to be entered in order to access the account.

Each account must have at least two individuals as Authorised Representatives. The Authorised Representatives have access to the accounts in the Union Registry and are authorised to initiate processes such as surrender of allowances and transfer of allowances on behalf of the account holder.

More than two Authorised Representatives can be appointed to each account. Authorised Representative with 'view only' access to the account may be apointed. A maximum of six Authorised Representatives may be appointed.

Certain transactions in the Union Registry require actions to be undertaken by two Authorised Representatives in order to be finalised.

These are:

- Addition to the Trusted Account List
- Surrender of allowances
- Deletion of allowances and cancellation of Kyoto Units

- Exchange of allowances

3.2.9.7 Public information accessible through the web page

Public information regarding the Icelandic part of the Union Registry is accesssible on the Environment Agency of Iceland webpage. The direct link is: http://www.ust.is/the-environment-agency-of-iceland/eu-ets/registry/#Tab3

3.2.9.8 Webpage of the Union Registry system

The Icelandic part of the Union Registry system will be accessible through the web address:

https://ets-registry.webgate.ec.europa.eu/euregistry/IS/index.xhtml

4 Policies and Measures

4.1 Roles and responsibilities

The Icelandic government adopted a Climate Change Strategy in 2007. It is conceived as a framework for action and government involvement in climate change issues. The Strategy sets forth a long-term vision for the reduction of net emissions of greenhouse gases by 50-75% until the year 2050, using 1990 emissions figures as a baseline. Emphasis is placed on reducing net emissions by the most economical means possible and in a way that provides additional benefits, by actions such as including the introduction of new low- and zero-carbon technology, economic instruments, carbon sequestration in vegetation and soil, and financing climate-friendly measures in other countries.

The Strategy sets forth the Icelandic government's five principal objectives with respect to climate change, which aim toward the realization of the above-described long-term vision:

- The Icelandic government will fulfill its international obligations according to the UN Framework Convention on Climate Change and the Kyoto Protocol.
- Greenhouse gas emissions will be reduced, with a special emphasis on reducing the use of fossil fuels in favor of renewable energy and climate-friendly fuels.
- The government will attempt to increase carbon sequestration from the atmosphere through afforestation, revegetation, wetland reclamation, and changed land use.
- The government will foster research and innovation in fields related to climate change affairs and will promote the exportation of Icelandic expertise in fields related to renewable energy and climate-friendly technology.
- The government will prepare for adaptation to climate change.

On the basis of the Strategy, two expert work groups were appointed to support the further development of climate policy. One group had the role of compiling and summarizing the best available scientific knowledge of the likely impact of climate change on Iceland and to present proposals on adaptation efforts (http://www.umhverfisraduneyti.is/media/PDF_skrar/visindanefndloftslagsbreytingar.pdf). The second work group was given the task of exploring the technical possibilities of mitigating greenhouse gas emissions in different sectors of the Icelandic economy (http://www.umhverfisraduneyti.is/media/PDF_skrar/Loftslag.pdf).

A Climate Change Action Plan was endorsed by the government in 2010. The Action Plan is a main instrument for defining and implementing actions to reduce emissions of greenhouse gases and enhance carbon sequestration. A committee appointed in 2011 oversees the implementation of the action plan, makes proposals for new projects, and provides information and advice. The committe is composed of representatives from the Prime Minister‘s Office, the Ministry of Finance and Economic Affairs, the Ministry of Industries and Innovation, the Ministry of the Interior, the Association of Local Authorities in Iceland and the Ministry for the Environment and Natural Resources who chairs the committee. The committe issues annual status reports where the Action Plan is reviewed both in terms of implementation of key actions, and actual emissions trends compared to set objectives. The committee‘s second annual report was released in 2013.

Act No. 70/2012 on Climate Change is the first comprehensive act on climate change in Iceland. The purpose of the legislation is twofold, to set a comprehensive act covering regulations set with the purpose to mitigate and adapt to climate change, and to cover the regulatory framwork related to the European Union Emisson Trading System, EU-ETS. The legislation replaces Act No. 65/2007 on the emissions of greenhouse gases.
The Environment Agency of Iceland (EA) is assigned with responsibility for the implementation of the provisions of the Act. The EA shall consult and cooperate with other authorities as closer specified in the Act. The Act sets the framework for a Climate Change Action Plan for reducing the net emissons of greenhouse gases and an Action Plan committee. The EA has the responsibility for the national inventory report and bodies are specified, which have a responsibility to deliver to the EA relevant information for the national inventory report. The EA has the main responsibility for the implementation of the Emission Trading System.

The Act on Nature conservation No 44/1999 is framework legislation and sets general criteria for nature conservation and concerns all human interference with nature. The act is also the main legal base for protection of areas, organisms, ecosystems and biodiversity. According to the Act the Minister shall call an Environmental Assembly following national elections and again two years later. The Environmental Assembly shall discuss environmental and nature protection and sustainable development. Members of parliament, representatives from government and municipal agencies, representatives from employers and NGOs shall be invited to the Assembly. Every four years the Environmental Assembly shall discuss implementation plans for sustainable development.

Welfare for the Future is the name given to Iceland’s national strategy for sustainable development, which was approved by the Government shortly before the World Summit on Sustainable Development held in Johannesburg in 2002. The original strategy set forth 17 objectives for environmental protection and resource utilisation, together with ancillary goals, and was intended as a framework for Iceland’s policy on sustainable development through 2020. The first version of the strategy contained a summary of short-term measures and realistic steps towards the achievement of the 17 objectives. The top-priority tasks for the achievement of the 17 objectives are reviewed every four years. New four-year priorities were thus defined following the Environmental Assemblies of

2005 and 2009. Key priorites under the objectives of Welfare for the Future over the four-year period from 2010-2013 were endorsed by the government in 2010.

4.2 Policies and measures and their effects

4.2.1 Cross cutting measures

The Climate Change Action Plan builds on the results of the expert group tasked with exploring technical possibilities of mitigating greenhouse gas emissions in different sectors of the Icelandic economy. The Action Plan covers economy wide measures and the responsibility for implementation and financing of mitigation actions are distributed across different ministries and agencies. Municipalites and private entities do also finance actions, which are aimed at reducing emissions.

Ten key action are specified in the Climate Change Action Plan:

- Implementation of the EU-ETS
- Tax on carbon
- Change the system for taxes and levies on vehicles and fuel
- Procurement of low-emission and environmentally friendly vehicles for government and local authorities uses
- Increased walking, cycling and use of public transportation
- Use of biofuels for the fishing fleet
- Electrification of the fishmeal industry
- Afforestation and revegetation
- Restoration of wetlands
- Enhanced research and innovation in the field of climate change

The Action Plans specifies 22 actions in addition to the ten key actions. These are examples of actions and projects focusing on mitigation or sequestration that are being implemented or being planned by authorites.

The EU Emissions Trading Scheme (EU-ETS) was transposed into Icelandic law in 2011 (Act No. 64/2011). Iceland‘s participation in the ETS started on 1 January 2012 when aviation became part of the emission trading system. Important changes were made to the system with Directive 2009/29/EC, which enlarged the scope of the trading system with respect to activities and gases. With these changes primary production of non-ferrous metals, aluminium and ferro-silicon, which have an important role in Iceland‘s economy were included in the trading system. These changes were transposed into law by Act No. 70/2012 on Climate Change. The emission trading system covers about 40% of emissions from Iceland from 2013.

A carbon tax on fossil fuel use was introduced on 1 January 2010 by Act No. 129/2009, on environment and natural resources taxes. The tax is levied on fossil fuels in liquid or gaseous form with respect to the carbon content of the fuels. The tax is 5.75 IKR/liter of gas and diesel oil, 5.00 IKR/liter of gasoline, 7.10 IKR/kg of fuel oil and 6.30 IKR/kg of petroleum gas or other gaseous hydrocarbons. With VAT (25.5%) the carbon tax on diesel oil and gasoline amounts to 7.23 IKR/liter and 6.28 IKR/liter respectively. The carbon tax on diesel and gasoline with VAT corresponds to about €16 per ton of emitted CO_2.

Welfare for the Future creates a framework for the objectives set by the Government with respect to sustainable development at the beginning of the 21st century. The Strategy is reviewed every four years in connection with the Environmental Assembly. Key priorites under the objectives of Welfare for the Future over the four-year period from 2010-2013 were endorsed by the government in 2010. These cover sustainable production and consumption, education, healhy and safe environment, protection of Icelandic nature, sustainable use of resources and global issues.

Environmental assment of public plans or programs is based on the Strategic Environmental Assessment Act No. 105/2006. The objective of the Strategic Environmental Assessment Act is to promote sustainable development and reduce environmental impacts by environmental assessments of public plans and programs that are likely to have a significant environmental impact. Environmental assessment for individual projects in Iceland is based on the Environmental Impact Assessment Act No. 106/2000. The objectives of the law are e.g. to ensure that an assessment of the environmental impact of a relevant project has been carried out before a consent is granted and to minimize as far as possible the negative environmental impacts of projects. Public consultation is a key feature of the legislation. Legislation on Environmental Assessments in Iceland is harmonized with European legislation through participation in the European Economic Area.

4.2.2 Energy sector

The Icelandic energy sector is unique in many ways, not the least because of its isolation from other European networks and the share of renewable energy in the total primary energy budget. Iceland has ample reserves of renewable energy in the form of hydro and geothermal energy, and these energy sources are mainly used for district heating and the production of electricity. The energy profile is unusual as 86% of primary energy supply in 2011 came from renewable resources, hydro and geothermal, the remaining 14% came from imported fossil fuels, which are mainly used in transportation and fisheries.

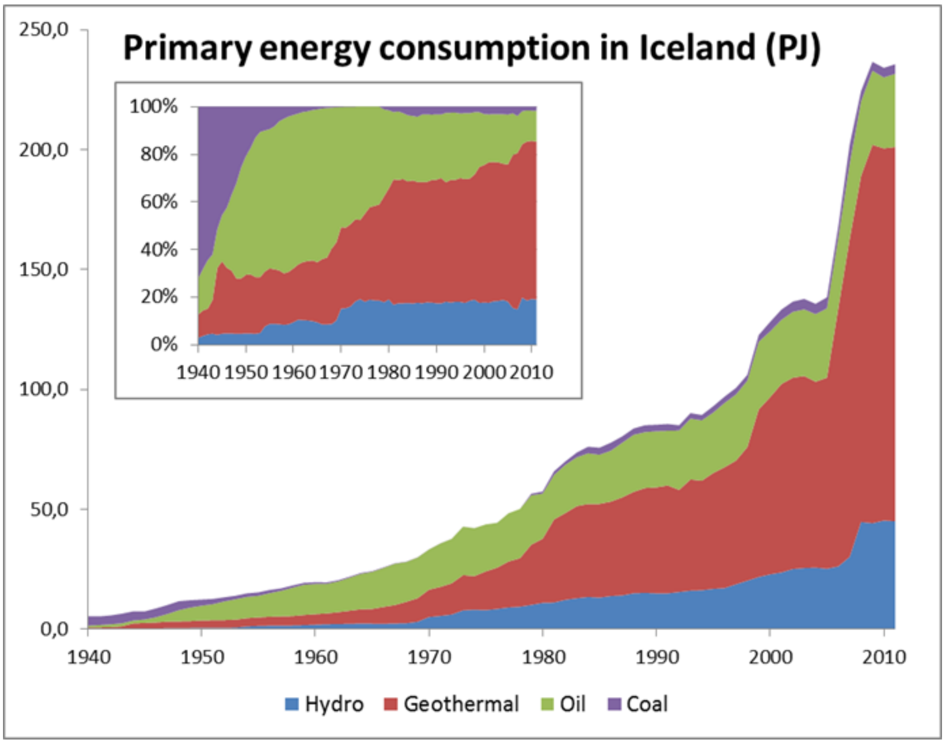

Figure 4.1 Primary energy consumption in Iceland 1940 – 2011.

Renewable energy sources (hydropower and geothermal power) account for 99.9% of electricity production and 99% of space heating. As a result, around 76% of final energy consumption in 2011 was from renewable energy resources.

Fossil fuels are imported to Iceland and consisted in 2011 mainly of oils (84%) and coal (16%), while gas import was small (0.3%). Coal was primarily used as raw material in the production of ferro-silicon and falls under industrial processes. A small percentage was used for production of cement. Cement has not been produced in Iceland since February 2012.

The main uses of oil in 2011 were for road transport (52%) and fishing (35%). Other uses were in construction (5.8%), manufacturing (4.6%), domestic aviation (1.3%) and national navigation (1.2%). Only miniscule amounts of oil are used for residential heating and electricity production in Iceland.

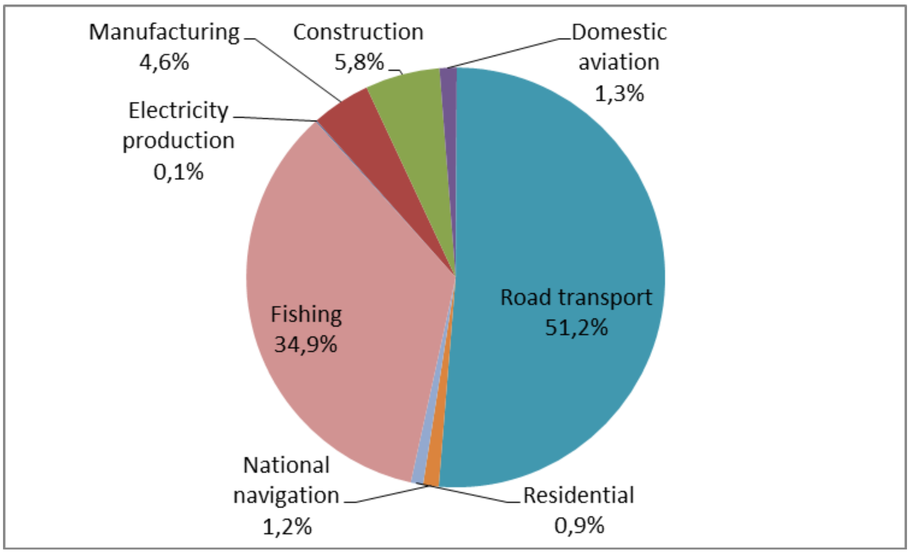

Figure 4.2 Use of liquid fossil fuels (wt %) in Iceland in 2011

A strategic approach on how to meet mandatory targets regarding renewable energy sources has been set out in the National Renewable Energy Action Plan, in accordance with Article 4 of Directive 2009/28/EC. The Directive was was transposed into Icelandic legislation by Act No. 40/2013, on renewable fuel in ground transportation and Act No. 30/2008, on guarantees of origin of electricity from renewable energy sources.

The target for share of energy from renewable energy sources (RES share) in gross final consumption of energy for 2020 is 72%. The RES share was 63,4% in 2005, and had increased to 75.7% in 2011, surpassing the 2020 target by 3,7%.

Carbon tax on fossil fuel use was introduced on 1 January 2010 by Act No. 129/2009, on environment and natural resources taxes. The tax is levied on the carbon content of fuels. The carbon tax is among 10 key actions in the 2010 Climate Mitigation Action Plan.

The fish-meal sector has been the biggest user of oil in manufacturing and electrification of fish-meal production is among the 10 key actions. The oil use in the sector has fluctuated between years in harmony with the catches of pelagic fish, mainly capelin. Electricity has gradually replaced oil and constituted roughly 50% of the energy use in the sector in 2012.

The electricity and space heating sectors in Iceland are close to full saturation of renewable energy sources and there is little room for further improvement or only minimal increases.

4.2.3 Transport sector

The main uses of liquid fossil fuels in Iceland is in transportation and fishing. The Climate Mitigation Action Plan focuses on this sector with five of ten key actions. Four key actions are described in this section. The carbon tax, which has a wider application is described under cross cutting measures.

Use of renewable energy in transportation and encouraging reduction in the use of fossil fuels are among issues identified in the Icelandic government‘s 2013 declaration of principles.

Græna orkan (Green energy) is a cluster for collaboration and exchange of experience between the private and the public sectors, which aims at increasing the use of renewable domestic energy in transportation. The project management team of Græna orkan has members from ministries and the private sector. The mandate is based on a parliament resolution from 2011. Among the objectives of the cluster are to link actors working toward energy shift in transportation, visualize steps taken, organize and create consensus on key actions that need to be implemented, promote education and sharing of information and encourage research and development. In 2011, Græna orkan published the report Energy-shift in transportation, with proposals for policy and objectives and an implementation plan.

An action plan was developed in 2013 for Reykjavik city with the aim of increasing the use of electricity in transportation in Reykjavik. The action plan contains 21 action proposals relating to education, revisions of rules, procurement, research and development, electric car hire, charging stations, economic incentives and public transportation.

4.2.3.1 Vehicles and fuels - changes in taxes and levies

Changes in taxes and levies for vehicles with the aim of reducing emissions comprise changes in excise duty, biannual fees and VAT. The excise duty and biannual fees are based on CO_2 emissions with special provisions for methane driven vehicles. Zero-emission vehicles, powered by electricity and hydrogen enjoy exemption from VAT.

Excise duty on vehicles based on CO_2 emissions
According to Act No 156/2010, amending Act No 29/1993 on excise duty on motor vehicles, fuel etc. , the excise duty on passenger cars has from 1 January 2011 been based on carbon dioxide emissions declared by the car manufacturer for combination of city and road driving. Where emissions data are not available, the tax rate is based on the weight of the vehicle. The registration tax is at minimum 10% ad valorem (max. 65 percent) of the taxable value. On passenger cars and other motor vehicles, which are not specifically mentioned in articles 4 and 5, excise duty shall be levied under the Main Category in the following table based on the vehicles registered emissions of carbon dioxide (CO_2), measured in grams per kilometer driven.

Table 4.1 Registered emissions and excise duty categories

Price Band	Registered emissions ($g\ CO_2/km$)	Main Category	Exception Category (Article 5)
A	0–80	0	0
B	81–100	10	0
C	101–120	15	0
D	121–140	20	0
E	141–160	25	5
F	161–180	35	10
G	181–200	45	15
H	201–225	55	20
I	226–250	60	25

Excise duty and semiannual car tax on methane vehicles is lowered.
There are special provisions for vehicles that drive on methane gas. They will get a discount of ISK 1,250,000 from the levied excise duty and pay the minimum semiannual car tax, ISK 5,000.

Biannual fee on vehicles is based on CO_2 emissions.
According to Act No 39/1988 the semi-annual road tax shall be based on the registered emissions of carbon dioxide (CO_2) of the vehicle concerned. Recorded emission is measured in grams per kilometre driven. Semi Annual road tax on each vehicle, weighing 3,500 kg or less, shall be ISK 5,255 for emission up to 121 gram of carbon emissions registered and ISK 126 per gram of registered emissions beyond that. If the information on registered carbon dioxide emissions are not available, the vehicles emission shall be determined 0.12 grams per kilogram of the vehicle's registered own weight, plus 50 grams of carbon dioxide. Semi Annual road tax on each vehicle, weighing more than 3,500 kg, shall be ISK 49,229 plus ISK 2,1 per kilo of the vehicles weight exceeding 3,500 kg. Semi Annual road tax on vehicles weighing more than 3,500 kg shall not exceed ISK 77,495 for each payment period.

No VAT on zero-emission vehicles with a cap.
According to Act No 69/2012, on amending Act No 50/1988 on VAT, as amended (exemptions, credits, etc.) the Director of Customs is authorized at clearance to waive VAT on electric or hydrogen vehicles to a maximum of ISK 1,530,000 and to a maximum of ISK 1,020,000 on a hybrid vehicle. At taxable sales, the taxable party may also be exempt from taxable turnover amounting to a maximum of ISK 6,000,000 due to electric or hydrogen cars and a maximum of ISK 4,000,000 for hybrid cars. This provision shall apply until 31 December 2014.

Fuels
Oils that are not fossil fuels are exempt from a levy on fuels, according to Act No. 87/2004. The same provision applies to such oils blended with oils of fossil origin. Fuels that are not of fossil origin blended with gasoline are exempt from a levy on gasoline, according to Act

No. 29/1993. The fossil fuel parts of oil and gasoline mixtures are not exempt from the levy as prescribed by Acts Nos 87/2004 and 29/1993.

4.2.3.2 Recent regulations on the performance of vehicles

Regulation No. 822/2004 on vehicle type and equipment, has been amended by regulations Nos. 871/2010, 377/2013 and 165/2008 to implement the following regulations: Regulation (EC) No 692/2008 (Euro 5 and 6 Standards), Regulation (EC) No 595/2009 (Euro VI Standard for heavy duty vehicles), regulations (EC) 661/2009 and (EU) 65/2012 (Environmental performance requirements for motor vehicles and tyres) and Directive 2006/40/EC (Emissions from air conditioning systems in motor vehicles). Regulation (EC) 1222/2009 (on the labelling of tyres with respect to fuel efficiency and other essential parameters) was implemented by Regulation No. 855/2012.

4.2.3.3 Renewable fuels

Act No. 40/2013, on renewable fuel used in land transportation, stipulates the use of minimum percentage of renewable fuel in fuel used for land transportation. A minimum of 3.5%, calculated as part of the total energy content of the fuel, is required from 1 January 2014. A minimum of 5% is required from 1 January 2015.

Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC was transposed into Icelandic legislation by Act No. 40/2013, on renewable fuel in ground transportation and Act No. 30/2008, on guarantees of origin of electricity from renewable energy sources. Iceland‘s National Renewable Energy Action Plan sets out a strategic approach and measures on how Iceland will meet the mandatory national targets for 2020 laid down in Directive 2009/28/EC, including the overall target and the 10% target on share of energy from renewable sources in transport.

4.2.3.4 Official procurement of vehicles, public transportation, walking and bicycling

Official procurement of low-carbon and fuel efficient vehicles and increased share of public transport, walking and bicycling in transport are among the 10 key measures in the 2010 Climate Mitigation Action Plan.

Low emission vehicles have been stressed in procurement of vehicles for the Icelandic state since 2011. The city of Reykjavik adopted a policy with the aim, e.g. to reduce negative effects of vehicle traffic on the environment and enhance environmentally friendly transportation. Procurement of low emission vehicles has been emphasized as part of the policy. The proportion of electric vehicles and vehicles powered with methane from the city‘s landfill of the vehicle fleet owned by Reykjavik city was 56% in early 2013.

Increased share of public transport, walking and bicycling in transport is an important component of the Transport Policy Plan 2011-2022 and the four year Transport Policy Plan 2011-2014 adopted as a parliament resolution on 19 June 2012.

Municipalities in the capital area and the government have initiated a 10-year pilot project, with the objective of doubling the share of public transportation in the greater capital region. An agreement was made between the Icelandic Road and Coastal Administration (IRCA) and the municipalities in the capital region in 2012. The IRCS supported public transportation in the capital region with 350 million IKR in 2012 and will provide 900 million IKR annually from 2013 for ten years with additional 550 millions in 2022. The pilot project will be evaluated biannually with the first report to be issued in 2014. The IRCA also supports, with annual 96 million ISK, public transportation between Reykjavik and three municipalities within the capital region‘s economic impact area.

The IRCA supports, with matching municipal funds, the construction of bike and walking paths in the capital region and trunk routes for bicycles. The Transport Policy Plan 2011-2022 foresees 200 – 250 millions ISK annual funds for these projects and additional 100 million ISK each year for construction of pedestrian bridges and tunnels.

Reykjavik city issued the action plan, „Hjólaborgin Reykjavík“ (Reykjavik the bike city) in 2010 with the objective of greatly increasing the use of bicycles in the city . The total length of bike paths shall increase from 10 km in 2010 to 50 km in 2015 and 100 km in 2020, a tenfold increase in ten years.

4.2.3.5 Use of biofuels for the fishing fleet

The Icelandic fishing fleet uses about 200.000 tons of oil/year. The fuel forecast prepared by the National Energy authority predicts increased use of alternative fuels such as biodiesel for the fishing fleet in the future. These alternative fuels could be imported and/or domestically produced. The Icelandic Maritime Administration has surveyed possibilities for using rapeseed oil, and worked in cooperation with farmers studying the feasibility of growing rapeseed.

The Ministry for the Interior provides, in 2013, 50 millions IKR in research grants for projects in the field of energy shift in shipping.

4.2.4 Industrial processes

The EU Emissions Trading Scheme (EU-ETS) has been implemented in Iceland under the provisions of the EEA Agreement and took effect with respect to aviation at the beginning 2012. Three aluminium plants, a ferrosilicon plant and one fishmeal factory fall under the ETS from 1 January 2013. Total emissions from these companies amount to about 40% of greenhouse gas emissions from Iceland. Four small installations, three fishmeal factories and a mineral wool producer, have been excluded from the ETS and are subject to equivalent measures.

The carbon tax (see the section on the energy sector) covers emissions from fossil fuels that are not included in the trading system. Economic instruments cover more than 90% of CO_2 emissions in Iceland with these measures. Thereby, a long-term foundation has been laid where the message is embedded in the economy that it pays to reduce greenhouse gas emissions. Responsibility and management of emissions from activities covered by the EU-ETS will be only in a minor way be influenced by the Government and specific measures to reduce emissions therefore focuses mainly on sectors outside the ETS.

The fishmeal industry has for decades been the biggest industrial user of oil in Iceland. Oil boilers used in the industry have gradually been replaced with electric boilers resulting in less oil consumption as can be seen in Figure 4.3.

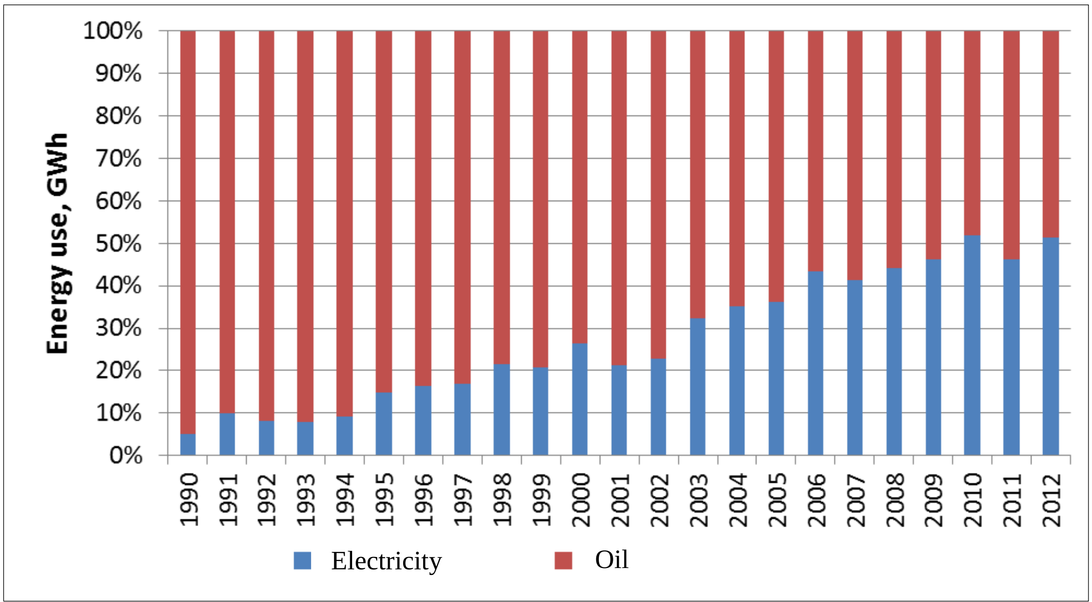

Figure 4.3 Energy use in the fishmeal industry, 1990 - 2012

This development is expected to continue as more fismeal factories convert to electric boilers. Industries in remote locations have faced barriers because of limited access to electricity. A new electric cable to the Vestman Islands installed recently will open up possibilites to reduce oil consumption in the islands.

4.2.4.1 *Ozone depleting substances and fluorinated greehouse gases*

Iceland's fulfilment of its obligations under the Montreal Protocol on Substances that Deplete the Ozone Layer is based on the Chemicals Act No. 61/2013, and Regulation No. 970/2013, on ozone depleting substances.

Ozone depleting substances are not produced in Iceland and no imports of ozone depeting substances have been registered after 2010. Uses of recycled ozone depleting substances are not permitted after 31 December 2014.

Legislation was passed in the Icelandic Parliament in 2009 (Act No. 92/2009) to control fluorinated gases, i.e. PFCs, HFC and SF_6. A regulation on fluorinated greenhouse gases was set in 2010 (Regulation No 834/2010). The Act implements Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases. The legislation covers limitations with respect to releases, uses, management, as well as registration, marketing, labelling and leakage checks. It also sets requirements regarding training and certification.

4.2.5 Agriculture

Icelandic agriculture is largely based on the cultivation of grass fields and the use of range land for pasture. Annual crops are only cultivated on 10-15% of the cultivated areal.

Numerous fertilizer experiments were performed on grass fields in Iceland during the years 1930-1970. The aim of these experiments were to find out suitable doses of fertilizer for Icelandic grass fields and which time of the spring was best for fertilizer application. Most of these experiments lasted only a few years. However, quite a few of them continued for 50-70 years and became long term experiments. Those experiments have been used to evaluate long term effects of mineral fertilizer on soil and to trace the track of the fertilized nutrients, how much of them were found in the yield, how much were accumulated in the soil and how much were lost.

Several experiments with different amounts of fertilizer on grass fields have been performed the last twenty years, especially in Northern Iceland. Some experiments with manure as fertilizer have also been performed, both experiments with different amounts of manure and experiments with different application time. Cultivation of barley has increased much in the last twenty years. Many experiments have been made to determine the best fertilizer doses for barley cultivation. The experiments mentioned above contribute to the goal of decreasing losses of nutrients from the soil, which in important both from environmental and economical view.

One of the challenges of future agriculture is to improve the productivity of agricultural land and resource-efficiency, including fertilizers and energy. The Agricultural University of Iceland conducts research into targeted use of legumes in grassland forage systems. Experiments with red and white clover in agricultural grasslands have shown that a well balanced grass-legume mixture with 70 kg/ha N-fertilization produces about the same net energy as a grass monoculture with 220 kg/ha N.

4.2.6 Waste sector

The government waste management policy is manifested in legislation on waste management, regulations based on the legislation and in national plans for waste management.

Icelandic legislation covering waste management is in accordance with EU legislation. Iceland has transposed into national law the *acquis* on waste covered by the EEA (European Economic Area) Agreement.

The Environment Agency published a National Plan for waste management 2004-2016 that applies to the whole country. The plan has the objective of reducing the generation of waste in a targeted manner, increasing re-use and recycling and reducing the proportion of waste that is sent for disposal. The National Plan provides advice for municipalities for their local plans. Most municipalites have developed regional waste management plans based on the National Plan. A new National Plan (2013-2024) was published by the Ministry for the Environment and Natural Resources in 2013.

Regulation No. 737/2003 on waste management prescribes that ways to fulfill objectives of reduced organic waste destined for landfills be laid out in the National Plan for waste management. The share of organic waste shall have been reduced to 75% of total waste in 2009, 50% in 2013 and 35% in 2020, with 2005 as a reference year. The objective for 2013 had been surpassed in 2009.

Regulation No. 738/2003 on landfilling of waste, requires collection of landfill gases to be further outlined in environmental permits. Landfill gas is collected at Álfsnes, Iceland‘s largest landfill, and the methane is used for powering vehicles in the capital area.

Waste management in Iceland has changed considerably in recent years. Recovery of waste has increased and primitive waste incinerators and unmanaged landfills have been closed.

About 66% of waste was recovered in 2011 compared with 15% in 1995. The percentage of landfilled waste was 31% in 2011 compared with 79% in 1995.

4.2.7 Land use land use change and forestry (LULUCF)

Land use land use change and forestry is a sector of major importance and has figured prominently in Iceland's climate policy from the start. Opportunities for mitigation efforts by carbon sequestration through afforestation and revegetation are abundant, and rewetting of drained wetlands provides possibilites for halting carbon dioxide emissions. Activities in the LULUCF sector are among 10 priority actions in the 2010 Climate Mitigation Action Plan.

Iceland elected revegetation under Article 3.4 for the first commitment period of the Kyoto Protocol. The revegetation activity involves establishing vegetation on eroded or desertified land or reinforcing existing vegetation.

The Soil Conservation Service of Iceland (SCSI) was founded in 1907. Its main tasks are to combating desertification, sand encroachment and other soil erosion, promotion of sustainable land use and reclamation and restoration of degraded land. Much experience and knowledge has been gained during 100 years of fighting soil erosion and restoring land quality in Iceland. This experience is the basis for a Land Restoration Training program launched by the Government of Iceland in 2007. The training program, which is since 2010 a United Nations University program, is open for post-graduates and/or professionals from the developing countries. The aim is to increase the capacity of the students to lead projects on land restoration in their home countries.

A Parliament resolution was passed in 2002 on a revegetation action plan. Sequestration of carbon in vegetation and soil is among four main objectives stated in the action plan. The action plan sets the framework for revegetation activities in the period 2003 – 2014. Work has started on the preparation for a new revegetation action plan.

The first general act on regional afforestation projects was passed in 1999 (Act No. 56/1999). Earlier acts covered projects in East-Iceland (Act No. 32/1991) and South-Iceland (Act No. 93/1997). These acts were repealed by Act No. 95/2006 on regional afforestation projects. Afforestation on at least 5% of land area below 400 m above sea level should be aimed for in each of the regional projects. Regional afforestation plans spanning 40 years shall be made for each of the five regions. Contracts spanning at least 40 years on participation in afforestation projects shall be made with each landowner who receives funding. The regional projects fund up to 97% of agreed afforestation costs.

Hekluskógar, the Mt. Hekla afforestation project, was launched in 2007. The project is based on a 10 year funding agreement and is run in collaboration between The Soil Conservation Service of Iceland and The Iceland Forest Service. The area covers about 90 thousand hectars of eroded land with little vegetation in the vicinity of Mt. Hekla.

A new forestry strategy was presented to the Minister for the Envionment and Natural Resources in January 2013, after stakeholder consultation and a general invitation to send comments. The director of the Iceland Forest Service was responsible for the preparation of the strategy. The strategy is divided into five main areas of emphasis: i) Building up a forest resource, ii) Forest utilization, value and innovation, iii) Society, access and health, iv) Envionmental quality and biodiversity, v) Climate change. Among goals and means to achieve them are enhancement of the role of forests as carbon sinks and to adapt forestry to climate change.

The first forestry degree program in Iceland was started in 2004 at the Agricultural University. The first foresters graduated with a BSc degree in 2007 and the first MSc degree was awarded in 2008.

A Wetland Center was established at the Agricultural University in 2008. Among the objectives is to carry out research linked to restoration of drained wetlands. The Wetland Center made an agreement with Rio Tinto Alcan in 2010 on a 4 year project with the objective to rewet 5 km^2 of drained wetlands. Another objective is to develop methods to measure and estimate with acceptable accuracy the success of the project with repect to the the release of greenhouse gases.

4.3 Policies and measures in accordance with Article 2 of the Kyoto protocol

4.3.1 Bunker fuels

The EU Emissions Trading Scheme (EU-ETS) was transposed into Icelandic law in 2011 (Act No. 64/2011). The transposition included directive 2008/101/EC by which aviation became included in the trading scheme. Act No. 64/2011 was repealed by Act No. 70/2012 on Climate Change. Iceland's participation in the EU-ETS started on 1 January 2012 when aviation became part of the emission trading system.

The initial scope of the trading system with respect to aviation covered all flights departing from or arriving in an aerodrome in the European Economic Area. With a temporary derogation from the directive, enforcement of the trading system has been limited to flights within the European Economic Area. Fights within Iceland and flights between Iceland and destinations in the European Economic Area fall under Act No. 70/2012, which requires airline operators to remit allowances to competent authorities to cover their greenhouse gas emissions.

4.3.2 Minimization of adverse effects

The first part of IPCC's fifth assessment report, published in 2013, confirms that warming of the climate system is unequivocal and that there is a clear human influence. Continued emissions of greenhouse gases will cause further warming resulting i*nter alia* in more frequent weather extremes, increased contrasts in precipitation, melting of sea ice and glaciers, and sea level rise and ocean acidification. Adverse effects of climate change can be reduced by limiting global warming through reductions in greenhouse gas emissions. Iceland‘s efforts to reduce emissions and increase carbon seqestration can therefore be expected to contribute to limiting adverse effects in other countries.

Iceland has focused on supporting developing countries with projects that aim at strengthening infrastructure in order to increase resilience to climate change (see Chapter 7).

Table 4.2 Policies and measures

Name of policy or measure	Primary purpose	Greenhouse gases primarily concerned	Type of instrument	Status	Implementing entity
Cross sectoral instruments					
Cimate change strategy – 2007	A framework for action and government involvement in climate change issues	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	Strategy	Ongoing	
Climate change implementation plan – 2010	An instrument for the government to implement policies and ensure compliance with respect to climate change obligations	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	Action plan	Ongoing	Ministries, municipalities
Iceland's National Strategy for Sustainable Development – 2002 to 2020	A basic document for authorities and others to use in order to visualize and form priority projects in the field of sustainable development		Strategy	Ongoing	
Carbon tax on fossil fuel use	Reduced emissions from fossil fuels	CO_2	Fiscal	Ongoing	
Reykjavik City Climate and Air quality Policy	Reduction of GHG emissions and improved air quality	CO_2, CH_4	Strategy	Ongoing	City of Reykjavik
Energy					
The Icelandic National Renewable Energy Action Plan – 2012	Strategic approach and concrete measures on how Iceland will meet mandatory national targets for 2020	CO_2	Action plan	Ongoing	Ministry of Industries and Innovation, National Energy Authority
Grants for geothermal exploration in cold areas	Increase access to geothermal energy for space heating	CO_2	Fiscal	Ongoing	National Energy Authority
Transport					
Implementation plan for transport – 2011-2014 and 2011-2022	Sustainable transportation	CO_2	Policy and action plan	Ongoing	Ministry of the Interior, municipalities
EcoEnergy (Græna orkan)	Aims at increasing the use of renewable domestic energy in transportation	CO_2	Cluster for collaboration	Ongoing	Ministries and the private sector
No VAT on zero-emission vehicles with a cap	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	Ministry of Finance and Economic Affairs
Biannual fee on vehicles is based on CO_2 emissions	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	Ministry of Finance and Economic Affairs
Excise duty on vehicles based on CO_2 emissions	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	Ministry of Finance and Economic Affairs

Table 4.2 – continued					
Name of policy or measure	**Primary purpose**	**Greenhouse gases primarily concerned**	**Type of instrument**	**Status**	**Implementing entity**
Reduced excise duty and semiannual car tax on methane vehicles	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	Ministry of Finance and Economic Affairs
Exemption from excise duty and carbon tax for CO_2 neutral fuels	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	Ministry of Finance and Economic Affairs
Low-emission vehicles in public procurement	Reduce emissions from transportation	CO_2	Sustainable public sector	Ongoing	Ministries and the City of Reykjavík
Parking benefits	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	City of Reykjavík
Increased public transportation and cycling	Reduce emissions from transportation	CO_2	Fiscal	Ongoing	Ministry of the Interior, municipalities
EU emission trading scheme	Reduce emissions of GHG from aviation	CO_2	Emissions Trading Scheme, Economic	Ongoing	The Environment Agency of Iceland
Industrial processes					
EU emission trading scheme	Reduce emissions of GHG from stationary sources	CO_2, PFCs	Emissions Trading Scheme, Economic	Ongoing	The Environment Agency of Iceland
Land use land use change and forestry					
Parliamentary resolution on revegetation implementation plan 2003-2014	Carbon sequestration	CO_2	Action plan	Ongoing	Soil Conservation Service of Iceland
Regional afforestation projects	Carbon sequestration	CO_2	Action plan	Ongoing	Regional implementation committees
Mt. Hekla afforestation project	Carbon sequestration	CO_2	Action plan	Ongoing	The Soil Conservation Service of Iceland and The Iceland Forest Service
Waste					
Implementation plans for waste – 2004 – 2016 and 2013 to 2024	Waste reduction, more efficient use of natural resources	CH_4, CO_2, N_2O	Implementation plan	Ongoing	The Environment Agency of Iceland, municipalities
Act No. 55/2003 on waste management and regulations based on the act.	Minimal adverse effects of waste on the environment	CH_4, CO_2, N_2O	Legal	Ongoing	The Environment Agency of Iceland, municipalities

5 Projections and total effects of measures

5.1 Introduction

Iceland's 2010 Climate Change Action Plan was based on business-as-usual emissions projection scenario and a „with-measures"-projection derived by subtraction of estimated mitigation gains from individual actions. A new with measures projection was finalized for this submission in November 2013. Some of the measures in the Action Plan have been taken into account although not all of the have been fully implemented. The new projection is the first to estimate emissions and carbon sequestration up to 2030 and hence forms a basis for a longer-term action plan to reduce net emissions. As the new projection was made just before the submission of the 6th NC, a reevaluation of the Action Plan on the basis of the projection has not been concluded.

The chapter starts with tables summarizing the results of the projections by sector and gas, and a table with a summary of key variables and assumption used for the projections. The summary is followed by chapters with projections for each sector containing descriptions of methologies, key drivers and projection sensitivity.

The starting point for the projections is Iceland's National Inventory Report (NIR) submitted in 2013. Global warming potentials from the 2nd AR were used for the projections to maintain consistency with the NIR.

5.2 Summary of projection drivers and results

Table 5.1 shows a summary of key variables and assumptions used in the projection analysis. Key variables such as GDP and population growth affect most sectors.

Table 5.1 Summary of key variables and assumptions used in the projections

Key assumptions		**Historical**						**Projected**			
Assumption	**Unit**	**1990**	**1995**	**2000**	**2005**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
General economic parameters											
GDP	**Index**	63.0	63.9	81.1	100	100.6	103.3	118.1	134.8	153.1	171.3
GDP growth rate	**%**	0.6	0.8	2.6	8.1	1.6	4.7	3.0	2.7	2.6	2.3
Population	**1000**	256	268	283	300	318	320	331	348	364	378
International oil prices	**USD/ barrel**	33	25	33	40	79	90	105	127	133	139
Energy sector											
Total gross inland consumption											
Oil	**PJ**	15.6	16.7	16.4	15.1	11.0	10.1	9.7	10.1	11.8	12.5
Total gross electricity generation by type											

Oil	**GWh**	6	8	4	8	2	2	4	4	4	4
Hydropower	**GWh**	4,159	4,677	6,350	7,015	12,592	12,507	13,451	13,451	13,793	14,112
Geothermal	**GWh**	283	290	1,323	1,658	4,465	4,701	5,250	5,800	6,000	6,100
Other	**GWh**							5	10	15	20

Table 5.2 and Figure 5.1 show Iceland´s historical and projected greenhouse gas emissions without LULUCF from 1990 to 2030 segmented by sector. Emission peaked in 2008 at almost 5,000 Gg CO_2-eq then decreased by 12% until 2011 when they were around 4,400 Gg CO_2-eq. Emission projections estimate that total emissions without LULUCF will decrease in comparison with 2011 levels by about 75 Gg CO_2-eq until 2020 and 100 Gg CO_2-eq until 2030. This decrease is due to decreases in the Transport and Waste sectors.

Table 5.2 Historical and projected greenhouse gas emissions by sector (Gg CO_2-eq)

Sector	**1990**	**2000**	**2010**	**2011**	**2015**	**2020**	**2030**
Energy	1,158	1,368	969	906	827	855	1,030
Transport	621	674	900	864	886	802	603
Industry (incl. PFC/HFC/SF_6/Solvents)	878	985	1,896	1,805	1,902	1,909	1,914
Agriculture	706	653	643	641	642	650	667
Waste management	145	196	210	198	147	121	101
Total without LULUCF	3,508	3,876	4,618	4,413	4,404	4,338	4,314
Memo Items:							
International bunkers	322	632	565	626	782	901	1,099
Aviation	222	411	381	426	574	695	890
Marine	100	221	184	201	208	207	209

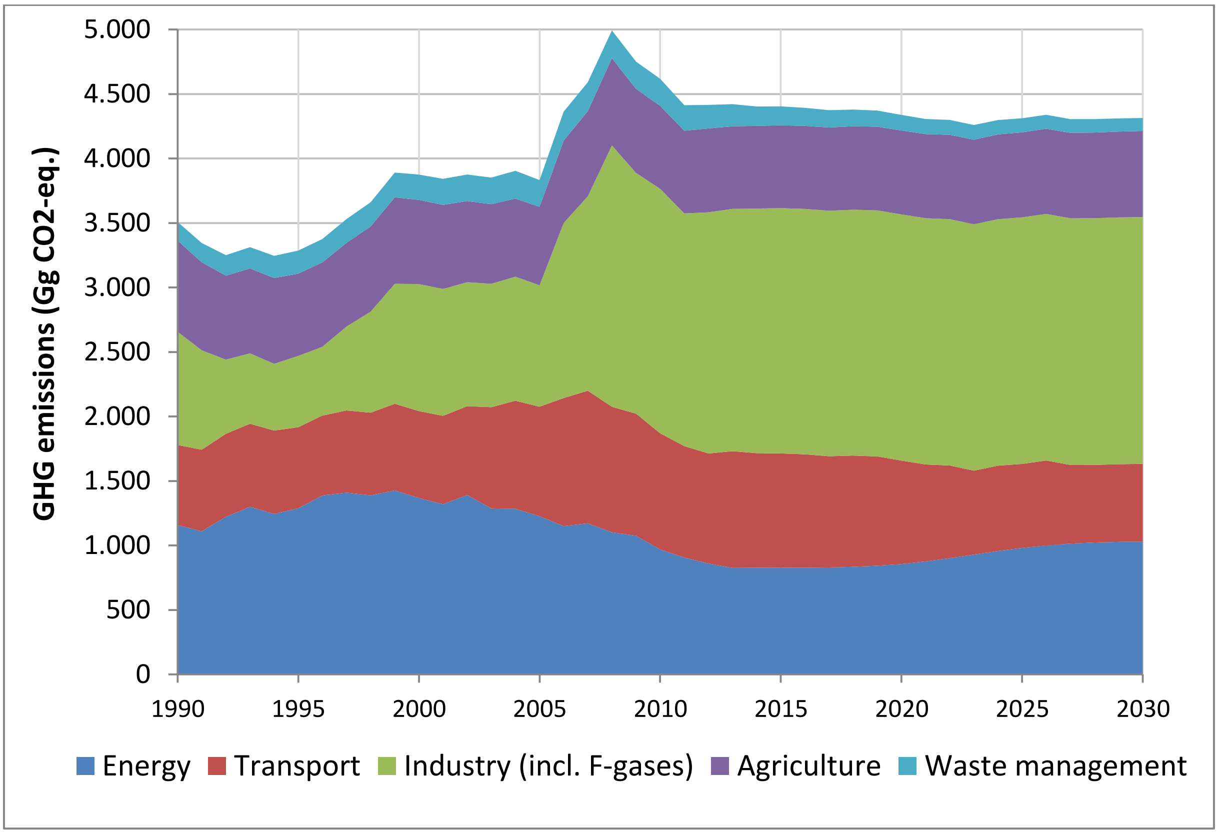

Figure 5.1 Estimated greenhouse gas emissions by sector (Gg CO_2-eq)

Table 5.3 and Figure 5.2 show Iceland´s historical and projected greenhouse gas emissions without LULUCF from 1990 to 2030 on gas-by-gas basis.

Carbon dioxide emissions made up 75% of Iceland´s total emissions (without LULUCF) in 2011 and this proportion is projected to remain constant until 2030. CO_2 emissions decrease by 74 Gg between 2011 and 2020 and by an additional 17 Gg until 2030. The main driver behind this trend is decrease in emissions from the transport sector. Slower reduction of CO_2 emissions in 2020 – 2030 is caused by projected increase in emissions from the fishing fleet.

Methane emissions amounted to 10% of Iceland´s total emissions (without LULUCF) in 2011 and are projected to be 8% of the emissions in 2030. The change in emissions can be attributed to decreased emissions from waste disposal, which will lead to 100 Gg CO_2-eq (22%) less emissions of CH_4 in 2030.

Nitrous oxide made up 10% of Iceland´s total emissions (without LULUCF) in 2011 and is projected to increase to 11% in 2030. The main driver behind this trend is an increase of N_2O emissions from agricultural soils.

The share of PFC emission decreased from 12% of Iceland´s total emissions (without LULUCF) in 1990 to 1.4% in 2011. The emission reductions were accomplished through improved process control in the aluminium industry. PFC emissions peak in relation to start ups and expansions in the industry and decrease again when balance is reached in the operation of the new units. PFC emissions are estimated to increase from 80 Gg in 2012 to

100 Gg in 2017 due to increased production capacity in the aluminium industry and then remain constant until 2030.

HFC emissions amounted to 3% of Iceland´s GHG emissions in 2011. This proportion is projected to increase to 4% in 2030. The reason is the ongoing switch from CFCs and HCFCs to HFCs leading to a build-up of HFC in the stock of refrigeration systems and therefore higher emissions in the future.

Emissions of SF_6 emissions are projected to remain constant at their 2011 level. It is assumed that the larger amount of SF_6 in the grid and enhanced leakage control offset each other.

Table 5.3 Historical and projected greenhouse gas emissions subdivided by gas (Gg CO_2-eq)

Greenhouse gas	**1990**	**2000**	**2010**	**2011**	**2015**	**2020**	**2030**
CO_2	2,160	2,776	3,432	3,333	3,312	3,259	3,241
CH_4	406	440	459	444	389	364	346
N_2O	521	495	454	448	456	461	467
PFCs	420	127	146	63	99	100	100
HFCs	0	36	123	121	145	151	156
SF_6	1	1	5	3	3	3	3
Total without LULUCF	3,508	3,876	4,618	4,413	4,404	4,338	4,314

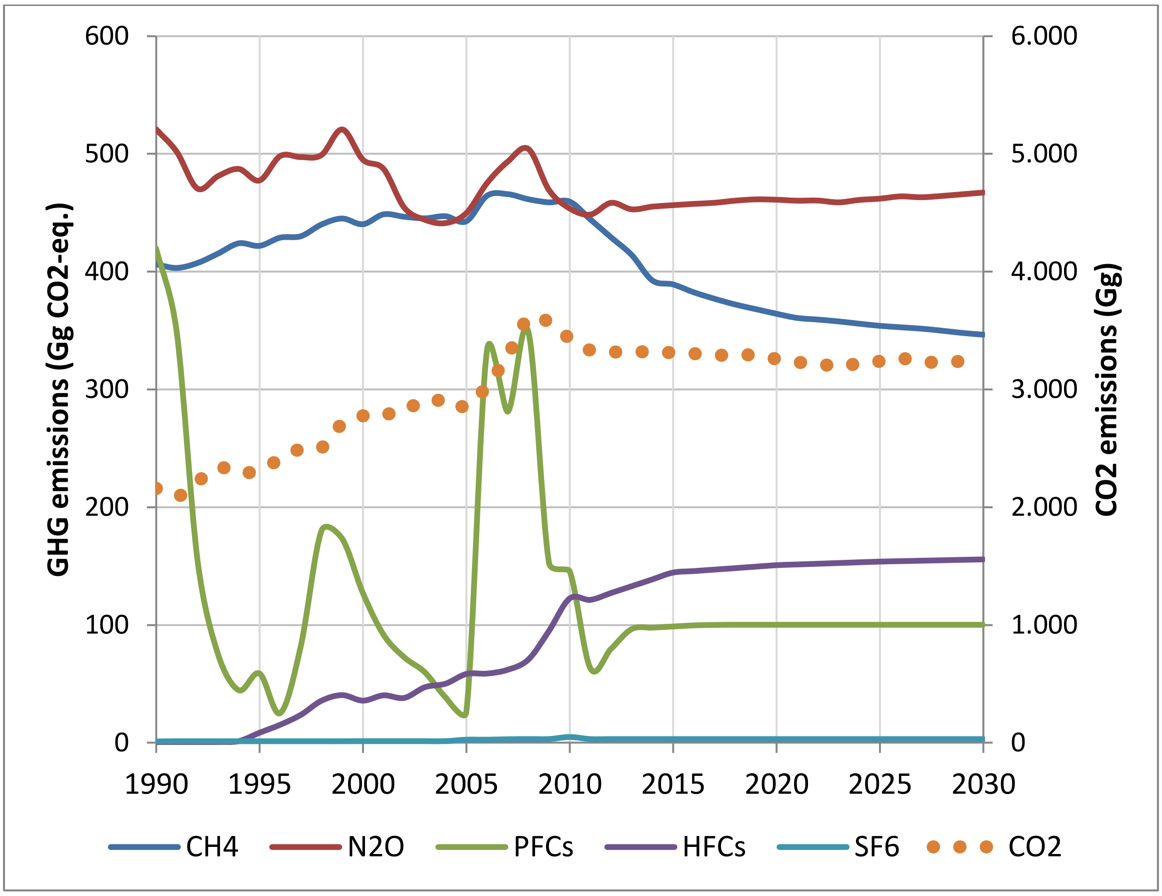

Fig. 5.2 Historical and projected greenhouse gas emissions subdivided by gas (Gg CO_2-eq). A separate scale is used for CO_2 emissions.

Table 5.4 and Figure 5.3 show historical and projected total greenhouse gas emissions. Emissions falling under the Emission Trading System are shown and projected net removals from Article 3.3 and 3.4 activities.

Table 5.4 Historical and projected total greenhouse gas emissions without LULUCF, development of Article 3.3 and 3.4 activities and emissions that fall under ETS.

	2008	**2009**	**2010**	**2011**	**2012**	**2015**	**2020**	**2030**
Total emissions without LULUCF	4,994	4,751	4,618	4,413	4,416	4,404	4,338	4,314
Article 3.3 (ARD)	-103	-116	-136	-162	-171	-199	-266	-361
Article 3.4(Revegetation)	-178	-182	-187	-193	-198	-213	-238	-287
ARD&Revegetation	-281	-298	-323	-356	-369	-412	-503	-648
Total minus Art. 3.3 and 3.4	4,713	4,453	4,295	4,058	4,046	3,992	3,835	3,666
Emissions falling under ETS	NA	NA	NA	NA	18	1,778	1,779	1,781
Total minus ETS	see above				4,398	2,627	2,559	2,533
Total minus Art. 3.3 and 3.4 and ETS					4,028	2,214	2,055	1,885

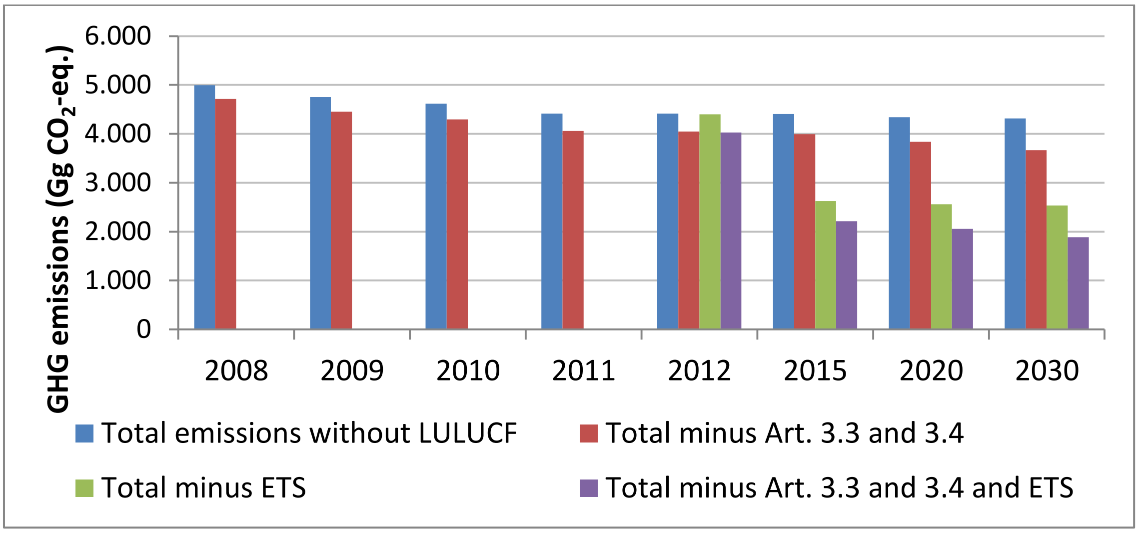

Figure 5.3 Historical and projected total emissions without LULUC, total emissions minus Article 3.3 and 3.4 activities; total emissions minus ETS emissions and total emissions minus ETS and Article 3.3 and 3.4 activities.

5.3 Sector specific methodology and results

5.3.1 Energy (including transport and fugitive emissions)

5.3.1.1 Introduction

The Energy sector in Iceland accounted for 40% of the total GHG emissions (excluding LULUCF) in Iceland in 2011. The main sources were fuel combustion (90%) and geotherma energy extraction (10%).

Iceland relies heavily on its geothermal energy sources for space heating with over 90% of all homes/buildings heated with geothermal water. Since electricity is used as main energy for heating buildings that are located in “cold areas”, about 99% of all buildings in Iceland are heated with renewable energy sources. Electricity is produced with fuel combustion (0.01% of the total electricity production in 2011) at two locations that are located far from the distribution system (two islands). Some public electricity facilities have emergency backup fuel combustion power plants which they can use when problems occur in the distribution system. Those plants are however very seldom used, apart from testing and during maintenance. Emissions from hydropower reservoirs amounted to 18 Gg of CO_2-equivalents, emissions from geothermal power plants to 182 Gg of CO_2-equivalents and emissions from diesel engines used for electricity production amounted to 1.7 CO_2-equivalents, in 2011. The weighted average GHG emissions from electricity production in Iceland in 2011 were thus only 11.7 g per kWh.

Hardly any energy-related CO_2 emissions fall under the EU ETS, as the electric utilities are based on renewable energy. Apart from domestic flights (accounted for about 18 Gg in 2012), only the fuel use from a single fishmeal plant, leading to emissions of about 5 Gg per year, as well as the fuel use at the ferrosilicon and the aluminium plants (about 10 Gg per year) falls under the scope of the EU ETS in the Energy sector.

5.3.1.2 Main sector subcategories

The main subsectors in the energy sector in 2011 were transport (49%, mainly road transport), fishing (29%) and manufacturing industries and construction (11%). Remaining emissions came from geothermal energy (10%) and residential/commercial/institutional (1%). Mobile sources therefore accounted for over 80% of the Energy sector emissions.

5.3.1.3 Methodology

The projections of GHG emissions from fuel combustion activities are mainly based on the National Energy Authority's (NEA)[1] forecast for use of fossil fuels for the period 2008 – 2050, as recalculated in 2012. In the forecast the fuel consumption is estimated per sector based on historical experience and given assumptions for future development. Emissions of carbon dioxide, methane and nitrous oxides from fuel consumption per sector were calculated by multiplying the fuel related energy consumption by fuel and source specific emission factor. The main assumptions regarding fuel consumption for each sector are given in Table 5.5.

Table 5.5 Summary of key variables and assumptions used in the energy projections analysis

	Unit	1990	1995	2000	2005	2010	2011	2015	2020	2025	2030
Electricity and heat (oil)	TJ	759	658	515	422	299	350	211	206	205	205
Manufacturing industry, construction	TJ	4,674	4,699	5,557	5,509	2,658	2,396	2,493	2,463	2,648	2,723
Fishing	TJ	8,881	10,429	9,791	8,496	7,217	6,751	5,967	6,406	7,914	8,508
Transport:	TJ	8,558	85,87	9,026	11,370	12,049	11,580	12,377	11,764	9,533	8,819
Road transport	TJ	7,310	7,672	8,462	10,698	11,277	11,040	11,612	10,976	8,702	7,953
Aviation	TJ	450	419	394	369	300	287	343	357	375	388
Navigation	TJ	797	496	170	304	472	253	653	648	645	643

[1] http://www.orkustofnun.is/media/eldsneyti/Eldsneytisspa-2012.pdf

5.3.1.4 Electricity and heat

As mentioned above relies the electricity and heat production in Iceland on renewable energy sources. Emissions from geothermal power plants are included under fugitive emissions. Emissions from hydropower reservoirs are accounted for under the LULUCF sector in the Icelandic greenhouse gas inventory, and are therefore not included here. Electricity is produced with fuel combustion (0.01% in 2011) at two locations that are located far from the distribution system (two islands). Some public electricity facilities have emergency backup fuel combustion power plants which they can use when problems occur in the distribution system. However, apart from testing and during maintenance, those plants are seldom used. According to the fuel forecast around 4 GWh per year will still be produced with diesel engines during the projection period. It is further assumed that the same EF that has been used in the 2013 GHG inventory will apply during the whole period.

Some district heating facilities, which lack access to geothermal energy sources, use electric boilers to produce heat from electricity. They depend on curtailable energy. These heat plants have back up fuel combustion in case of electricity shortages or problems in the distribution system. Fuel combustion for heat production in the commercial, institutional and residential sectors include the heating of swimming pools, heating of commercial buildings and the use of LPG for cooking. Most swimming pools use geothermal water and electricity is by far the most common energy source for cooking, though gas cookers have become more common in recent years. According to the fuel forecast the downward trend of the fuel use in this sector since 1990 is likely to stagnate as the consumption is already very low. The EFs from the 2013 GHG inventory for CO_2, CH_4 and N_2O have been used for the whole period. The results are shown in Table 5.6 and Figure 5.4.

Table 5.6 Historical and projected emissions from electricity and heat production

	Unit	**1990**	**1995**	**2000**	**2005**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
Electricity and heat (oil)	Gg	57	47	36	28	23	25	15	14	14	14

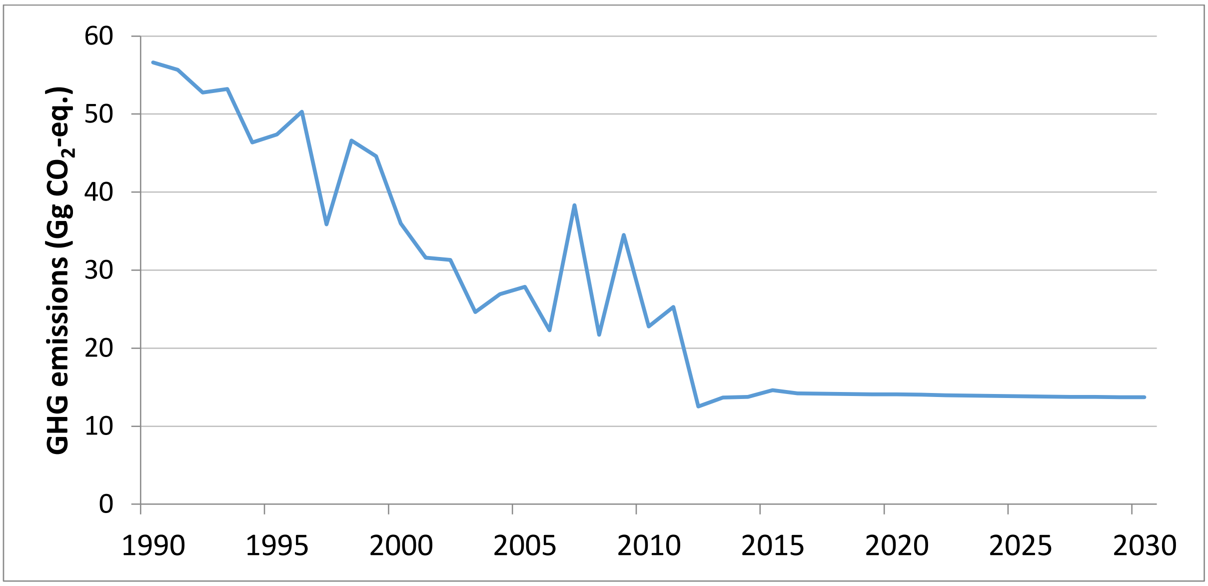

Figure 5.4 Historical and projected emissions from electricity and heat production

5.3.1.5 Manufacturing industry and construction

Emissions from the Manufacturing Industries and Construction accounted for 10.9% of the Energy sector in 2011. Mobile combustion accounted for 51.2% of the emissions in the Construction sector. The two most important sources of stationary combustion in the sector were the fishmeal industry and cement production. The cement plant was closed down in 2012 and is not expected to start again during the projection period. Emissions from fishmeal production have decreased since 1990, due to replacement of oil with electricity and less production. Fuel use in the metal production industry has also decreased since 1990 due to replacement of oil with electricity. Emissions in the construction sector rose from 1990 to 2007, but the sector collapsed in 2008 due to the financial crises. According to the NEA's fuel forecast, fuel use in the construction sector will rise slightly in the projection period with slow recovery in the sector. Fuel use is expected to rise at half the rate of the GDP per year. Fuel use in the stationary combustion of the manufacturing industry will remain at the 2011/2012 level per tonne of product. Projected increased production of the fishmeal industry will be more than counteracted by the further replacement of oil with electricity in the sector. Fuel use at 29 kg of oil per tonne of processed fish in beginning of the period is projected to have dropped to 8 kg per tonne by 2050. Fuel use in the metal production industry – which falls under the EU ETS – is projected to be the same per tonne of produced metal as it was in 2012, as the possibilities for further replacement of oil with electricity within these installations are limited. The total emissions from these installations in the energy sector in 2012 amounted only to 11 Gg.

The fuel and source specific EFs from the 2013 GHG inventory for CO_2, CH_4 and N_2O have been used for the whole period. The results are shown in Table 5.7 and Figure 5.5.

Table 5.7 Historical and projected emissions from manufacturing industry and construction

	Unit	1990	1995	2000	2005	2010	2011	2015	2020	2025	2030
Manufacturing industry and construction	Gg	377	378	450	447	213	193	182	184	195	201

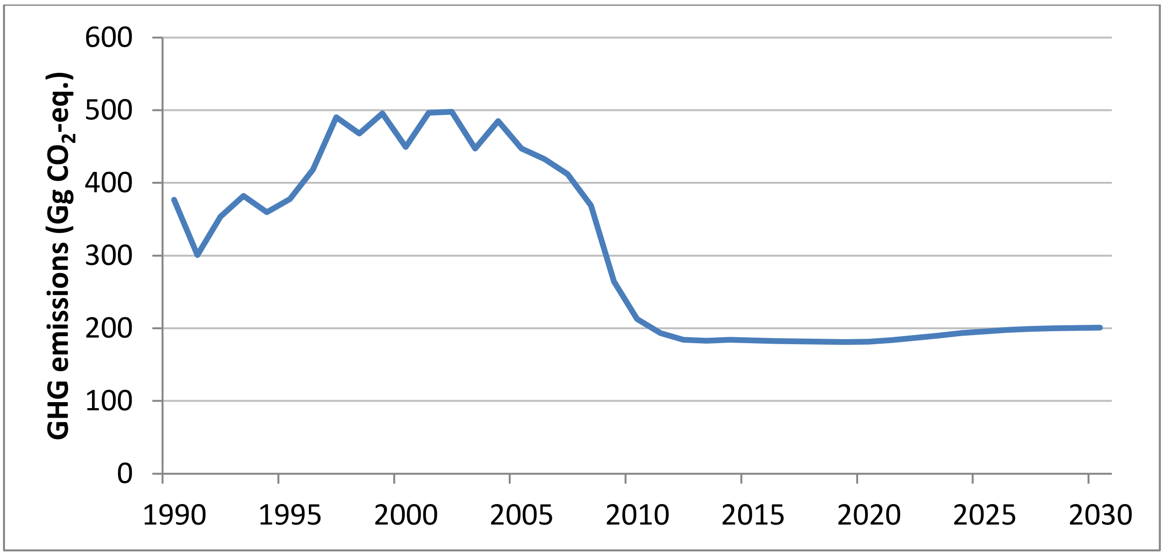

Figure 5.5 Historical and projected emissions from the manufacturing industry and construction

5.3.1.6 Fishing

Emissions from fishing amounted to 29% of the energy sector emissions in 2011. Emissions from fishing increased until 1996 owing to increased number of processing ships, fishing at distant fishing grounds, heavier fishing gears (trolls), fishing at deeper seas and cooling tanks. Fuel efficiency has improved, especially from 2002, due to improved fishing techniques and increased catch per day at sea.

The fuel consumption of the fishing fleet is taken from the NEA's fuel forecast. The fuel consumption wass calculated from expected future catch, taken into account different fishing techniques, expecting further improvement of the fuel efficiency driven by fuel price.

The EF's are the same as in the 2013 GHG inventory. The results are shown in Table 5.8 and Figure 5.6.

Table 5.8 Historical and projected emissions from fishing fleet

	Unit	1990	1995	2000	2005	2010	2011	2015	2020	2025	2030
Fishing	Gg	662	780	728	633	540	505	447	478	590	633

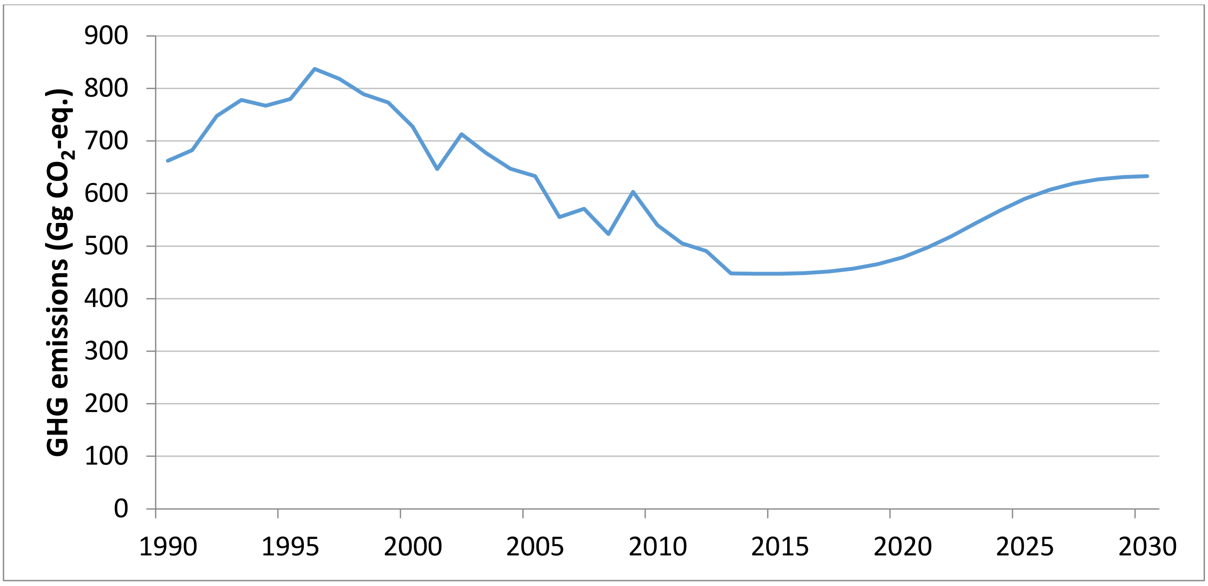

Fig. 5.6 Historical and projected emissions from fishing fleet

5.3.1.7 Fugitive emissions (geothermal power plants and distribution of oil products)

Emissions from geothermal power plants are reported as fugitive emissions and amount to 99.8% of the fugitive emissions in Iceland. Distribution of oil products is also a source but very small.

Emissions from geothermal power plants are site and time-specific, and can vary greatly between areas and also between the wells within an area as well as by the time of extraction. Emissions from geothermal power plants in the projection period were calculated as the average emissions for the last five years.

Emissions from distribution of oil products were estimated by adding up all the projected fuel use for the projection period and multiplying with the EFs from the 2013 GHG inventory. The results are shown in Table 5.9 and Figure 5.7.

Table 5.9 Historical and projected development of fugitive emissions

	Unit	1990	1995	2000	2005	2010	2011	2015	2020	2025	2030
Geothermal power plants	Gg	62	83	154	118	193	182	181	181	181	181
Distribution of oil products	Gg	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5

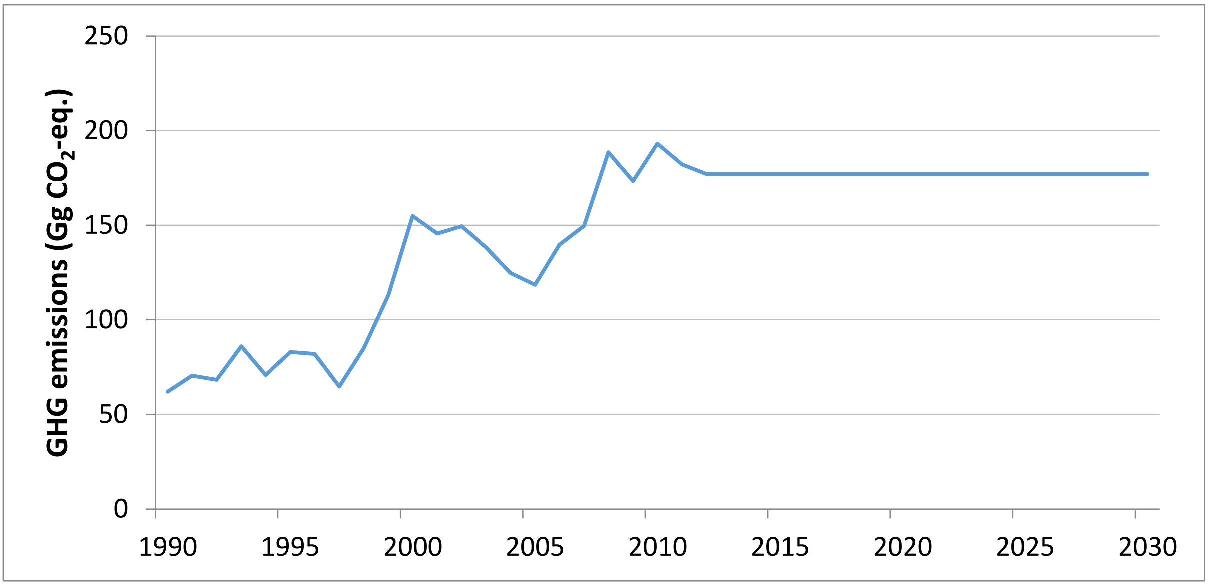

Figure 5.7 Historical and projected development of fugitive emissions

5.3.2 Transport

5.3.2.1 Introduction

Transport accounted for 49% of the emissions in the energy sector and 20% of the total GHG emissions in Iceland in 2011. Emissions within the transport sector are dominated by road transport. Emissions from road transport peaked in 2007.

Projected fuel consumption for road transport is based on NEA's fuel forecast adjusted for the share of renewable energy in the sector, according to the provisions of Act No. 40/2013 on renewable energy in road transport, which incorporates EU decision 28/2009 into Icelandic law.

The main assumptions in the fuel forecast regarding the road transport are:

- Energy efficiency of vehicles will continue to increase. This will be connected to the price of fuels so high fuel prices will lead to decreased fuel use per mileage.
- Number of passenger cars per capita will increase slightly as more women will be registered car owner, but the ratio for men will remain the same.

- Number of LDV will follow GDP and the number HDV will follow GDP, though one percentage point lower.
- The yearly driven mileage per passenger car and per LDV, without price influence will be 12,400 throughout the projection period. The yearly driven mileage per HDV, without price influence, will be 25,200 km in 2012/2013, 26,000 in 2020 and 26,350 in 2030.

The main assumptions regarding fuel consumption in road transport are given in Table 5.10.

Table 5.10 Summary of key variables and assumptions used in projecting emissions from road transport.

	Unit	1990	1995	2000	2005	2010	2011	2015	2020	2025	2030
Transport:	TJ	8,558	8,587	9,026	11,370	12,049	11,580	12,377	11,764	9,533	8,819
Road transport	TJ	7,310	7,672	8,462	10,698	11,277	11,040	11,612	10,976	8,702	7,953
- Gasoline	TJ	5,726	4,075	6,388	7,022	6,640	6,392	6,546	6,114	4,748	4,289
- Diesel oil	TJ	1,584	1,597	2,057	3,617	4,612	4,606	4,266	3,569	2,913	2,719
- Biofuels	TJ	0	0	17	59	25	42	569	1,076	851	779
Aviation	TJ	450	419	394	369	300	287	343	357	375	388
Navigation	TJ	797	496	170	304	472	253	653	648	645	643

Fuel split by emission control technology and EFs for estimation of emissions from road transport are the same as used in the 2013 GHG inventory.

Domestic aviation and navigation accounted for less than 5% of the emissions in the transport sector in 2011. The fuel consumption is based on the fuel forecast. Main assumptions of the fuel forecast regarding domestic flight is that passenger flight will increase in proportion to the population growth and cargo flight will increase by 2 percentage points less than the GDP for the period. Fuel use for navigation will be close to the average of the years 2007 and 2008. EFs for aviation and navigation are the same as in the 2013 GHG inventory. The results are shown in Table 5.11 and Figure 5.8.

Table 5.11 Historical and projected emissions from road transport, aviation, and navigation.

	Unit	1990	1995	2000	2005	2010	2011	2015	2020	2025	2030
Road transport	Gg	529	561	633	800	844	824	812	728	576	527
Aviation	Gg	32	30	28	26	21	20	24	25	27	28
Navigation	Gg	60	37	13	23	35	19	49	49	48	48

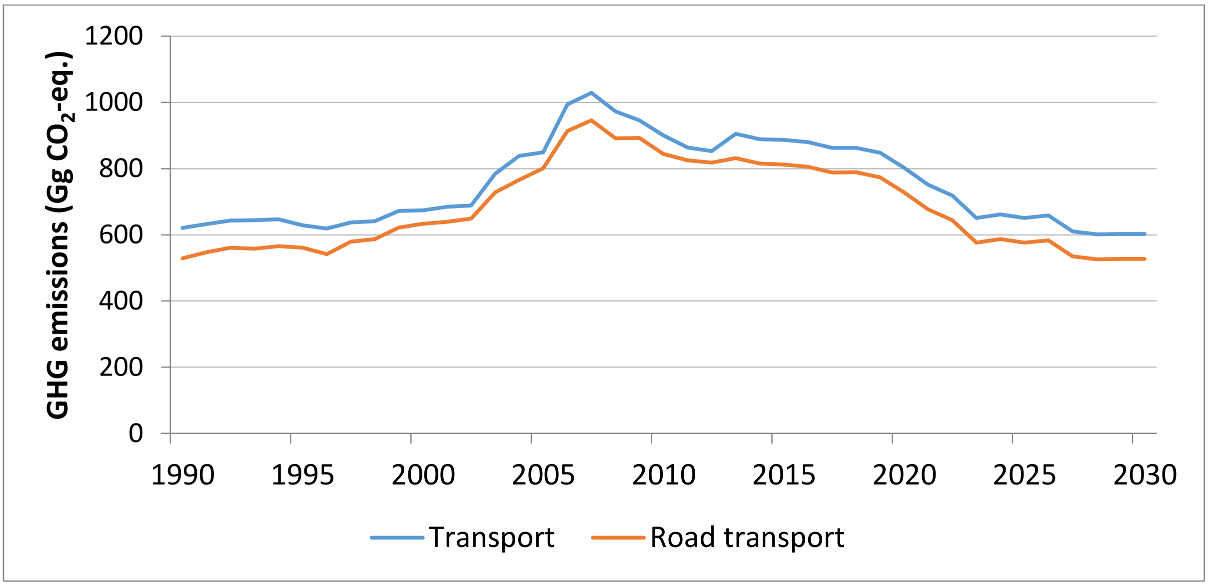

Figure 5.8 Historical and projected emissions from transport.

5.3.2.2 Sensitivity of projections

Future emissions in the energy sector are dependent on fuel prices and economic parameters. This factor is even more fundamental in small economies, where single projects can have large impacts. Another factor of uncertainty is the Icelandic króna (ISK). The Icelandic economy is very dependent on import of goods. A weaker currency increases inflation and prices (oil prices) whereas a stronger currency decreases the prices of imported goods, leading to more consumption. There is great uncertainty linked to the economic data, in particular in the more distant future.

Emissions in the energy sector are not very sensitive to prices of emission allowances, as hardly any energy-related CO_2 emissions fall under the EU ETS. Electric utilities in Iceland are based on renewable energy. Apart from domestic flights (accounted for about 18 Gg in 2012), only the fuel use from a single fishmeal plant, leading to emissions of about 5 Gg per year, as well as the fuel use of the ferrosilicon and the aluminium plants (about 10 Gg per year) fall under the scope of the EU ETS in the Energy sector.

5.3.3 Industrial processes

5.3.3.1 Introduction

The industrial processes sector in Iceland accounted for 41% in Iceland in 2011. The production of raw materials is the main source of industrial process-related emissions for CO_2 and PFCs. The dominant category within the industrial process sector is metal production which accounted for 92% of the sector's emissions in 2011; aluminium is produced in three plants and ferrosilicon in one plant. Emissions also occur as a result of the use of HFCs as substitutes for ozone depleting substances and SF_6 from electrical equipment.

5.3.3.2 Main sector subcategories

The dominant category within the industrial process sector is metal production which accounted for 92% of the sector's emissions in 2011. Emissions from consumption of halocarbons and SF_6 accounted for 7% in 2011 and emissions from mineral products for 1%. No chemical industry exists in Iceland. Aluminium production accounted for 71% of the total industrial processes emissions in 2011. Aluminium is produced at three plants, all based on the prebaked anode cells production technology. The main energy source is electricity (produced with renewable energy sources) and industrial process CO_2 emissions are due to the anodes that are consumed during the electrolysis. In addition aluminium production gives rise to emissions of PFCs. Production of ferroalloys accounted for 21% of the industrial processes emissions in Iceland in 2011.

5.3.3.3 Methodology

The projections of GHG emissions from industrial processes for the production of raw materials are mainly based on the projected production statistics, as estimated by the Environment Agency and plant specific emission factors. For major industry plants the production statistics are relative to the installed capacity.

The Rio Tinto Alcan aluminium plant has been operating since 1969. The plant was expanded in 1997 and the current installed capacity is 190 thousand tonnes per year. There are plans to further increase the capacity to 205 thousand tonnes, but those plans have not been visualized yet, so they are not taken into account in the projections of GHG emissions. The Century Aluminium plant was established in 1998 and expanded to 260 thousand tonnes in 2006. A project to increase production by using higher voltage has been started. For the projections the production capacity is increased from 280 thousand tonnes in 2012 to 300 thousand tonnes in 2018, which is the allowed production according to the operating permit. Alcoa Fjardaal started operation in 2007 and reached full production capacity (346 thousand tonnes) in 2008. Alcoa has an operating permit allowing production of 360 thousand tonnes of aluminium per year, and is aiming towards this capacity by increasing the voltage. In the projections it is estimated that the production capacity will increase from 345 thousand tonnes in 2012 to 360 thousand tonnes in 2016. For the aluminium plants, plant specific amount of electrodes per tonne of aluminium and plant specific five-year average carbon content of the electrodes are used to calculate CO_2 emissions. When calculating PFC emissions a 5-year average parameters for the anode effect are used for Rio Tinto Alcan, and a 3-year average parameters for Century Aluminium and Alcoa Fjardaal. The reason for the shorter period for those two plants is recent expansions (start-ups) at the plants. Generally PFC emissions are higher during start up and expansion. The anode effect parameters are then multiplied with the EFs in the 2013 GHG inventory.

At Elkem Ferrosilicon plant the production was exceptionally low in the years 2008 - 2011, therefore the period 2003 - 2012 was thought to be better representative for the production capacity at the plant. The projected amount of different reducing agents (input) and microsilica (output) per tonne of ferrosilicon are proportional to the production and the carbon content of the various input and output materials are based on the plant specific 5-year average.

The cement plant ceased operation in 2012 and is not expected to start operation again in the period. Mineral wool production was high in the years from 2004 - 2010. Therefore an average production for the years 2003 to 2012 is thought to be better representative for the production at the mineral wool plant. Input materials are proportional to production as it was in 2012. The carbon content and EFs are from the 2013 GHG inventory.

The cement production plant (when operating) was below the installed capacity limits in Annex I of the EU ETS directive. The mineral wool production plant is exempted from the scope of the EU ETS as it emits less than 25 Gg CO_2 per year.

Table 5.12 summarizes the production statistics used in the projections and results are shown Table 5.13 and Figure 5.9.

Table 5.12 Summary of key variables and assumptions used in the projections analysis

Production statistics	**Unit**	**1990**	**1995**	**2000**	**2005**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
Cement production	kt	114	82	143	126	33	38	0	0	0	0
Mineral wool production	kt	6	7	8	9	5	5	8	8	8	8
Aluminium production, total	kt	88	100	226	272	819	806	840	850	850	850
- **Rio Tinto Alcan**	kt	88	100	168	179	190	185	205	205	205	205
- **Century Aluminium**	kt	-	-	58	93	276	280	293	300	300	300
- **Alcoa**	kt	-	-	-	-	353	345	356	360	360	360
Ferrosilicon production	kt	63	71	108	111	102	105	109	109	109	109

Table 5.13 Historical end projected GHG emissions from industrial processes

	Unit	**1990**	**1995**	**2000**	**2005**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
Aluminium production	Gg	558	213	480	443	1,383	1,278	1,369	1,370	1,370	1,370
Ferrosilicon production	Gg	208	243	374	375	369	375	377	377	377	377
Cement production	Gg	52	37	64	54	10	20	0	0	0	0

Other production	Gg	49	44	20	2	1	2	2	2	2	2

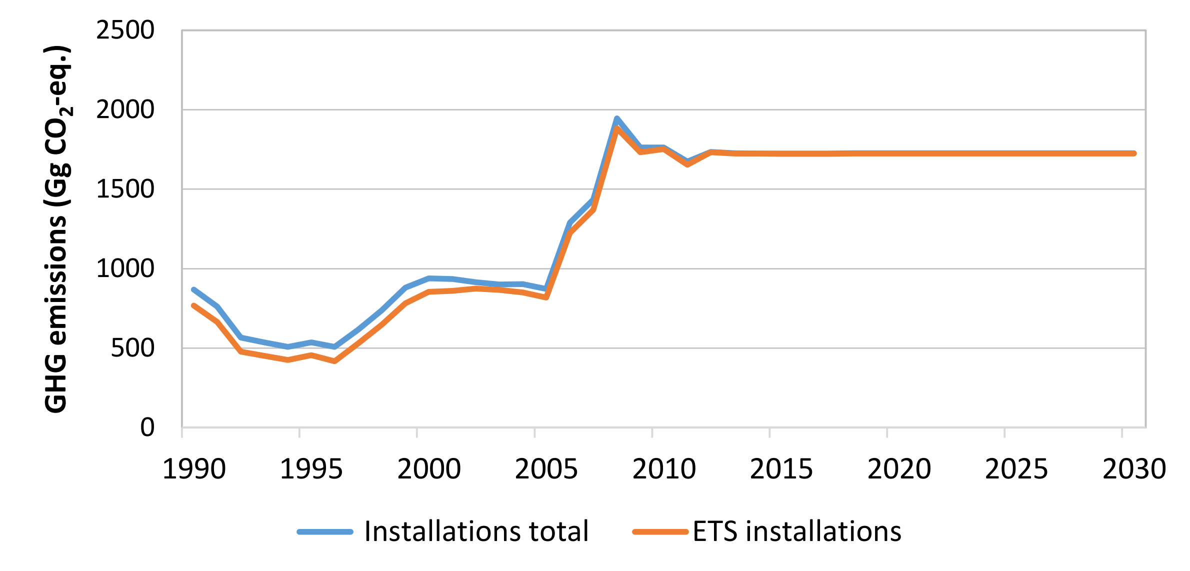

Figure 5.9 Historical and projected emissions from industrial processes and the share of emissions falling under the ETS

5.3.3.4 Sensitivity of projections

Future emissions in the industrial processes sector (production of raw materials) are dependent on production capacity, prices of products (mainly aluminium) and prices of emission allowances. The production capacity is an even more fundamental factor in small economies, where single projects can have large impacts. Adding a single aluminium plant or even a silicon plant could increase Iceland's emissions 500 Gg per year or by 11% compared to projected emissions in 2015.

A major part (92% relative to the 2011 emissions) of the industrial process-related CO_2 and PFC emissions in Iceland falls under the EU ETS, as all four metal production plants fall under the scope of the system. Emissions in the industrial processes sector are sensitive to prices of emission allowances and also to the market price of the produced materials.

The emissions of carbon dioxide from aluminium production are close to 1.5 tonnes per tonne of aluminium with the technology known at present. Furthermore, the PFC emissions per tonne at the aluminium plants in Iceland are relatively low. To obtain lower the emissions from the aluminium production a new technology would need to be invented.

5.3.4 HFC and SF_6 consumption

5.3.4.1 Introduction

Hydrofluorocarbons (HFCs) are used first and foremost as refrigerants in Iceland. They are banned for most other uses (regulation 834/2010). HFCs substitute ozone depleting substances like the chlorofluorocarbon (CFC) R-12 and the hydrochlorofluorocarbons (HCFCs) R-22 and R-502, which are being phased out by the Montreal Protocol. The most common HFCs are HFC 125, HFC 134A, and HFC 143A. Imports of HFCs to Iceland started in 1993 and increased until 2010. The amount imported in 2011 was only half as much as the amount imported in 2010.

5.3.4.2 Main sector subcategories

HFC emissions originate from HFC use as refrigerant e.g. on board fishing vessels, in commercial, industrial, and domestic refrigeration, and vehicle ACs. HFC emissions from HFC use in metered dose inhalers (MDIs) occur as well. SF_6 is used as an insulation gas in switchgear and circuit breakers. HFC and SF_6 emissions occur due to leakage during installation, use, and disposal of gear containing respective gases.

5.3.4.3 Methodology

In Iceland´s NIR 2013 Tier 2 methodology was used to calculate HFC and SF_6 emissions. Future emissions were estimated based on emission factors found in Coenen et al. (2012)[2] which condensed a report by Schwarz et al. (2011)[3] into emission factors for HFC consumption from refrigeration equipment. Future emissions are calculated by multiplying 2010 emissions with a gas and application specific emission factor called grade 2 in Coenen et al. (page 126 and part B). SF_6 emissions are at a very low rate and kept constant at their 2011 level.

5.3.4.4 Key drivers with respective key assumptions for these models

HFC emissions from refrigeration increased steadily since their import started in 1993. Emissions doubled from 2007-2010 but decreased slightly in 2011 due to a drop in the imported amount. Because of the ongoing switch from CFCs and HCFCs to HFCs, imports have outweighed estimated emissions for almost two decades. This has led to a build-up of HFC in the stock of refrigeration systems, which in turn leads to higher emission estimates in

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[2] Coenen et al. (2012). Development of GHG projection guidelines. (http://ec.europa.eu/clima/policies/g-gas/monitoring/studies_en.htm)

[3] Schwarz et al. (2011): Preparatory study for a review of Regulation (EC) No. 842/2006 on certain fluorinated greenhouse gases", prepared for the EU Commission in the context of Service Contract No. 070307/2009/548866/SER/C4.

the future. The most important gas specific emission rates suggested by Schwarz et al. (2011) are shown in Table 5.14.

Table 5.14 Gas and application specific emission factors for future HFC emissions from the refrigeration sector based on 2010 emission estimates (%)

Application	Refrigerant	2010	2015	2020	2025	2030
Commercial refrigeration	HFC 125	100	72	79	82	85
	HFC 134a	100	63	68	71	73
	HFC 143a	100	69	76	79	81
Transport refrigeration	HFC 125	100	120	126	130	134
	HFC 134a	100	110	120	130	140
	HFC 143a	100	139	146	151	155
Industrial refrigeration	HFC 125	100	98	103	106	103
	HFC 134a	100	189	145	103	55
	HFC 143a	100	90	99	106	107
Mobile A/C	HFC 134a	100	110	90	54	25

The amount of SF_6 in Iceland´s national grid has increased steadily since 1990 because of continuous grid expansion. Efforts to reduce leakage intensified recently. It is assumed that the higher SF_6 amount in the grid and enhanced leakage control offset each other. Projected emissions are therefore kept constant at their 2011 level.

5.3.4.5 Projection results

For comparability and accounting reasons all HFC amounts are converted to CO_2-equivalents. Transport refrigeration is the most important HFC application in Iceland. The relatively high emission factors proposed by Schwarz et al. (2011) lead to estimated increase in emissions from transport refrigeration by 34 Gg CO_2-eq in 2020 and 42 Gg CO_2-eq in 2030 compared with emissions in 2011. Emissions from other refrigerant uses either increase slower or decrease so that the projected increase in total HFC emission becomes 29 Gg CO_2-eq by 2020 and 34 Gg CO_2-eq by 2030 (see Table 5.15.)

Table 5.15 HFC emission estimates and projected amounts from refrigeration and metered dose inhalers (Gg CO_2-eq)

Application	2010	2011	2015	2020	2025	2030
Domestic refrigeration	0.1	0.1	0.0	0.0	0.0	0.0
Commercial refrigeration	12.9	13.8	8.9	9.8	10.2	10.5
Transport refrigeration	85.8	82.6	110.4	116.4	120.8	124.9
Industrial refrigeration	17.1	17.9	17.7	18.0	18.1	17.2
Stationary A/C	0.4	0.6	0.6	0.8	0.9	1.0
Mobile A/C	5.6	5.6	6.1	5.0	3.0	1.4
MDIs	0.8	0.8	0.8	0.8	0.8	0.8
Total HFC emissions	122.5	121.4	144.5	150.8	153.8	155.7

5.3.4.6 Sensitivity of projections

The projected HFC emissions are a function of current emission estimates. The uncertainty of current emission estimates is considerable because of uncertainty associated with activity data and emission factors. AD uncertainty is related to the allocation of refrigerants to subcategories and was estimated at 176%. EF uncertainty is based on EF ranges in IPCC guidelines and was 130% in Iceland´s latest NIR. This resulted in a combined uncertainty of HFC emissions of 219%.

Additionally, future emissions are sensitive to changes in the regulatory environment of refrigerant use and advances in technology. Stricter regulations along with more rigorous compliance could lead to less emission from e.g. disposal of HFC contained in vehicle ACs.

5.3.4.7 Methodological differences to NC 5

The NC5 proposed an increase in HFC emissions of 2 Gg CO_2-equivalents per year until 2020 based on the development of HFC emissions in the years preceding the projection. From 2020 to 2030 emissions were were supposed to stay at the same level. The current projection, which is based on EFs proposed by Schwartz et al. (2011), shows a similar trend: an emission increase by about 3 Gg CO_2-eq. until 2020 which then levels off. The starting point of the current projection is higher than estimated emissions proposed in the NC5. Th 2010 emissions were below 80 Gg CO_2-eq in NC5 but are 122 Gg CO_2-eq. in the current estimate. This difference is based on an accelerated increase in HFC imports until 2010 and changes in methodology explained in more detail in Iceland´s NIR 2013.

5.3.4.8 Solvent and other product use

Emissions from Solvent and Other Product Use are less than 0.2% of Iceland´s total emissions and are kept constant in the projection.

5.3.5 Agriculture

5.3.5.1 Introduction

Icelanders are more or less self-sufficient in all major livestock products such as meat, milk, and eggs and import of meat products is regulated and limited. Traditional livestock production is grassland based and most farm animals are native breeds, i.e. dairy cattle, sheep, horses, and goats, which are all of an ancient Nordic origin, one breed for each species. These animals are generally smaller than the breeds common elsewhere in Europe. Beef production, however, is partly through imported breeds, as is most poultry and all pork production. There is not much arable crop production in Iceland due to a cold climate and short growing season. Cropland in Iceland consists mainly of cultivated hayfields, but potatoes, barley, beets, and carrots are grown on limited acreage.

5.3.5.2 Main sector subcategories

Emissions from agriculture accounted for 640 Gg CO_2-eq. in 2011 or 14.5 % of Iceland´s total emissions without LULUCF. Agricultural CH_4 emissions originate from enteric fermentation of livestock and management of livestock manure. N_2O emissions stem from agricultural soils and are mainly caused by the application of synthetic N fertilizer and animal manure to soils.

5.3.5.3 Methodology

In Iceland´s GHG inventory emissions are estimated using Tier 2 methodology for methane emissions from cattle and sheep and Tier 1 methodology for all other emissions. This methodology was also applied in the projection of greenhouse gas emissions from agriculture.

5.3.5.4 Key drivers with respective key assumptions

The key drivers for all methane emissions as well as N_2O emissions from manure application are the populations of livestock species. Livestock populations were projected into the future based on past trends and expert judgement, taking into account expected future population development and meat consumption behaviour. Projected livestock population development until 2030 is shown in Table 5.16 along with respective rationales.

Table 5.16 Livestock population projections until 2030 with respective rationales

Livestock category	Projected population trend	Rationale
Dairy cattle	Decrease until 2016, then slow but steady increase until 2030 (7% higher in 2030 than in 2016)	Dairy consumption increases proportionally to human population. Demand will first by met by increased productivity per animal, then by an increase in population.
Cows used for producing meat	65% increase until 2030 (compared to 2012).	Clear trend of last two decades projected until 2030.
All other cattle	Population kept constant at average of last 10 years.	Cattle population and beef consumption has been similar for three decades. Per head beef consumption is projected to decrease because of the ongoing shift in meat consumption from lamb and beef to pork and poultry.
All sheep	Population kept constant at average of last 10 years.	Per head consumption of mutton and lamb has decreased by 50% during the last 30 years. This trend is counteracted by an increase in exports.
Swine	38% increase until 2030 (compared to 2012).	Swine population development corresponds well with human population development of last two decades and is projected using human population as input.
Horses	Population kept constant at average of last 10 years.	Population has been constant for last two decades. Not influenced by meat demand.
Goats	40% increase until 2030 (compared to 2011).	Increasing trend of last two decades projected.
Minks	89% increase until 2030 (compared to 2012).	Increasing trend in mink skin production plus tangible plans to open Iceland´s biggest mink farm in the near future.
Other fur animals	Population kept constant at average of last 10 years.	No detectable trend in past population development.
Laying hens	17% increase until 2030 (compared to 2012).	Egg consumption per head deemed constant. Therefore increase proportional to human population increase.
Chicken	70% increase until 2030 (compared to 2012).	Increasing poultry consumption per head is reflected by increasing chicken population. Trend from 1990-2012 is projected until 2030.
Turkeys	64% increase until 2030 (compared to 2012).	Increasing poultry consumption per head is reflected by increasing turkey population. Trend from 1990-2012 is projected until 2030.
All other poultry	Population kept constant at average of last 10 years.	No population trends from 1990-2012.

Tier 2 methodology, which is used to estimate methane emissions from cattle and sheep, uses animal performance as further input data. Most variables were kept at their 2011 level except for annual milk production of dairy cattle which is projected to increase from 5600 kg/animal in 2012 to 6000 kg/animal in 2016 and then remain constant. This increase can be explained by both breeding and the ongoing switch from manual milking to automatic milking which increases productivity.

N_2O emissions are divided into direct and indirect N_2O emissions as well as emissions from the application of manure. The last subcategory is exclusively dependent on livestock population and performance characteristics either already described or kept constant at their 2011 levels. The former two subcategories depend on further input variables, most notably the amount of N in synthetic fertilizer applied. The amount of N in synthetic fertilizer applied is projected to increase by 10% between 2011 and 2030. The reasons for the projected increase are expected increases in dairy and barley production. The increase is not projected to be more than 10% because of a probable price increase of fertilizer and more efficient use of manure and fertilizer. Other factors influencing N_2O emissions from soils are the area of cultivated organic soils and the amount of crop products such as potatoes and barley. The area of cultivated organic soils has decreased from 65 kha in 1990 to 58 kha in 2011. This decrease is not projected to continue because of the expected increase in dairy production as well as an increase in barley production. The area of cultivated organic soils is therefore kept unchanged in the projection. Barley production is projected to increase by 188% until 2030 based on the trend since 1990. All other crops are kept constant at their 2011 levels.

5.3.5.5 Results

Assumed changes in livestock populations, animal performance, fertilizer use, and cultivated area, lead to an increase of total emissions from agriculture by 1.5% until 2020 and 4.1% until 2030 (compared to 2011). Total emissions from agriculture amount to 650 and 667 Gg CO_2-eq in 2020 and 2030, respectively. The increase is mainly caused by increased N_2O emissions from agricultural soils along with the higher N content of fertilizer applied. Emissions from manure management increase as well, corresponding to the expected increase in mink and poultry populations. Methane emissions from enteric fermentation, on the other hand, decrease slightly due to the fact that assumed livestock populations of sheep and some cattle categories (i.e. population average from 2003-2012) are below their 2011 level. Projection results are summarized in Table 5.17.

Table 5.17 Emission estimates for agriculture sector subcategories (Gg CO2-eq)

Subcategory	GHG	1990	2011	2012	2015	2020	2030
Enteric fermentation	CH_4	244	227	226	222	223	226
Manure management	CH_4	30	30	30	30	30	32
Manure management	N_2O	52	44	43	43	44	46
Agricultural soils	N_2O	380	340	351	348	353	364
Sum of sector	CH_4 and N_2O	706	641	650	642	650	667

5.3.5.6 Sensitivity of projections

Future methane emissions are highly dependent on the development of cattle and sheep populations. The cattle population has been stable during the last two decades whereas the sheep population decreased by 14%. If both populations were to increase by 20% in excess of the projected values by 2030, total emissions from agriculture would increase by 17% instead of the projected 4%. Both populations depend on hey production and, ultimately, on climate. Therefore significant increases in these populations are not to be expected. The amount of nitrogen in fertilizer applied is another key driver influencing emission estimates and this parameter has been oscillating more than livestock populations in the past.

5.3.5.7 Methodological differences to NC 5

Differences between the GHG projections in the 5th and the 6th National Communication reflect the differences between methodologies used in the calculation of agricultural GHG emissions in Iceland´s 2009 and 2013 NIRs. Emission estimates for 2007 were almost 24% lower in the 2009 NIR than in the 2013 NIR. The reasons for this difference are several methodological changes regarding N_2O emission estimates (listed in order of importance):

- increase of nitrogen excretion rate for sheep
- inclusion of emissions from the cultivation of organic soils
- increase of nitrogen excretion rate for dairy cattle

The new projection starts at a higher initial point as a result of these differences. The trend shown in both projections, however, is very similar. They show a slight emission increase because both projections use the same projection drivers and their predicted development has not changed dramatically. Projected population development and meat consumption behavior, for example, are very similar between projections. The current projection results in an emission increase of 4.1% until 2030 whereas the older projection predicted an emission increase of 3.6%.

5.3.6 Waste

5.3.6.1 Main sector subcategories

Emissions from the Waste sector accounted for 198 Gg CO_2 eq in 2011 or 4.5 % of Iceland´s total emissions without LULUCF. The main source is methane emissions from solid waste disposal on land (SWD), which accounted for 89% of the waste sector emissions. Other sources are waste water handling (CH_4 and N_2O), waste incineration (CO_2, CH_4, and N_2O) and biological treatment of solid waste (CH_4 and N_2O).

5.3.6.2 Methodology based on which IPCC methodology

Methane emissions from solid waste disposal on land and carbon dioxide emissions from waste incineration were estimated by using Tier 2 methodology, from the IPCC 2006 Guidelines, in Iceland´s GHG inventory. All other categories and gases are estimated using 2006 GL Tier 1 methodology. Tier 2 methodology for methane emissions from SWD are based on the First Order Decay method which assumes that the degradable organic component in waste decays slowly throughout a few decades.

5.3.6.3 Key drivers with respective key assumptions for these models

The key drivers for methane emissions from SWD are the composition and annual amount and of landfilled waste. Annual amounts of waste are deduced by projecting both annual amounts of waste generated and the fractions of these amounts going to SWDs. The amount of waste generated per capita agrees well with the development of the GDP index from 1995 to 2007. The financial crash in 2008 reduced GDP drastically and immediately, whereas the amount of waste generated per head decreased more slowly. This somewhat weakened the correlation between them. The relation between GDP and waste generation per capita from 1995-2007 (7.4 additional kg waste per capita and year per additional GDP index point) is used to project waste generation into the future with the year 2011 as starting point (1,277 kg per capita). However, it is assumed that by 2020 GDP increase and waste generation development will be decoupled due to efforts aimed at reducing waste generation. From 2020 onwards waste generation per capita is therefore assumed to remain stable at 1,451 kg.

The fraction of waste landfilled declined steadily from 1995 to 2010 (from 78% to 33% of all waste generated). This trend is projected into the future but at a slower rate. Rationale for prolonging the trend is an increase of waste separation which leads to an increase of recycling, reuse and composting. The commissioning of a biogas plant by Iceland´s biggest waste management firm, Sorpa, is also taken into account. This plant will probably be commissioned in 2015 and process 30 kt of mostly organic waste annually. Emissions from the plant are estimated under the chapter biological treatment of solid waste.

Waste composition for 2012 was estimated using the average of the years 2009 - 2011. Three assumptions were made for waste composition after 2012. New waste composition data by Sorpa shows that the share of paper in landfilled waste has decreased drastically (i.e. dropped from 23% of mixed household waste in the capital area in 2011 to 8% in 2013) due to increased efforts in waste separation. With a time lag this decrease is adopted for all waste landfilled by decreasing the paper share by two thirds between 2012 and 2015. The share of food waste is projected to decrease by 50% between 2012 and 2030 due to increased efforts in waste separation thus allocating food waste to the biogas plant and composting. As a result of the financial crisis, which had a heavy impact on the construction sector, the share of demolition waste was at a historic low from 2009 to 2011. The share expected to return to its pre-crisis of 9% in 2015. All other waste categories are adjusted accordingly.

Today, methane is only collected at the Álfsnes landfill. Future recovered amount of methane is estimated based on past recovery, the above mentioned projected waste amounts and composition as well as information from the operator Sorpa on methane recovery equipment in operation and planned future acquisitions. It is projected that the present increase in the recovered amount will continue until 2015. The recovered amount will then decrease proportionally to the decrease in the site´s methane production (due to decreasing amounts of waste landfilled). Methane recovery will start in 2014 at Glerárdalur, a SWDS in northern Iceland, and probably at Fíflholt in west Iceland in 2016. The recovered amounts for these two sites are based on past data and future estimates regarding waste amounts and composition. Recovery fractions are higher for Glerárdalur (60%), which is no longer in operation, than for Fíflholt (40%).

Projections of nitrous oxide emissions from wastewater were based on population projections. Sludge removal was kept constant at 2011 levels. Projected CH_4 emissions from wastewater were based on population trends and wastewater pathways. Emission pathway fractions were kept constant.

Only one of the 6 incineration plants in operation at the beginning of 2011 was still in operation in 2013. As autoproducer of energy it is allocated under the Waste sector. Its emissions were projected into the future using population data as a proxy. Waste fractions were kept constant at 2011 levels.

5.3.6.4 Projection results

Total GHG emissions from the waste sector increased from 1990 until 2007 because of an increase in methane emissions from increasing waste amounts being landfilled until the early 2000s. Decreased amount of waste landfilled since 2005 led to slightly decreased methane emissions since 2008. This trend is projected into the future mainly due to further reduction of organic waste being landfilled and increasing methane amounts being recovered. Thus net CH_4 emissions from SWD are projected to decrease from 8.4 Gg in 2011 to 3.5 Gg in 2030. Other waste sector GHG sources are expected to increase slightly. These other sources, however, only play a minor role. Waste sector emissions are summarized in Table 5.18.

Table 5.18 Waste sector emissions in Gg CO_2-eq

Subcategory	**GHG**	**1990**	**2011**	**2012**	**2015**	**2020**	**2030**
SWD emissions	CH_4	119	193	193	178	144	100
SWD recovery	CH_4	0	18	31	53	47	26
SWD emissions - recovery	CH_4	119	176	162	125	97	74
Wastewater	CH_4, N_2O	8	12	12	12	13	14
Incineration	CO_2, CH_4, N_2O	18	9	6	6	7	7
Biological treatment	CH_4, N_2O	0	3	3	4	4	6
Waste sector	CO_2, CH_4, N_2O	145	198	182	147	121	101

5.3.6.5 Sensitivity of projections

Methane emission estimates from SWD are rather uncertain for two reasons mainly:

- The amount of decaying waste depends on several factors e.g. mass of deposited waste, degradable organic matter content and how much of that organic content is decomposable.

- The amount of methane emitted over time depends on how fast the decomposable portion of the waste actually breaks down. Therefore, not only is there uncertainty regarding total SWD emissions but also how they are distributed over time.

The uncertainty of future waste amounts and composition create additional complications.

5.3.6.6 Methodological differences to NC 5

Methodological differences between GHG projections in NC5 and NC6 are a product of methodological improvements between NIRs in 2009 and 2013. The main changes are:

- Revision of waste amounts and waste composition data
- Introduction of new waste categories in FOD model
- Correction of mistakes in amounts recovered
- Correction of mistakes in wastewater emission estimates

These improvements (and the effect of the financial crisis) led to a considerably lower starting value (198 vs. 277 Gg CO_2-eq in 2011). The projection used in the NC5 predicted increasing emissions from waste incineration, which is not foreseen in the present situation.

5.3.7 Forestry

5.3.7.1 Introduction

At the time of human settlement of Iceland (870 AD) natural woodland did cover around 3000-3600 kha (28-31% of the total land area). As early as 1100 more than 90% of the original Icelandic woodland was eradicated. A survey of the remnants of the natural woodland was first done in 1972-1975 and the area was estimated to 125 kha. About 96-97% of the natural woodland was then lost. Ongoing remapping of the natural woodland though shows recovering. A current estimate of the area is 146 kha for 2011.

The natural woodland is almost only consisting of one tree species, mountain birch (*Betula pubescens*) that can rarely grow to more than 5 m height as is defined by FAO as minimal height of forest (7% of total). Most of the natural birch woodland does reach height at maturity between 2-5 m height (58%) but the rest, shrubland, covers 35% of the total. The minimum height for the in country definition of forest in Iceland is 2 m as used in the UNFCCC reports and described in the initial report under the Kyoto protocol. Consequently 65% of the natural birch woodland is defined as forest.

Organized forestry started in Iceland in 1899. Before the Second World War plantation was only sporadic but most of the effort was put in protection of the natural birch forest from grazing and uncontrolled firewood cutting. After the war afforestation and reforestation by planting of seedlings increased slowly, with some drawbacks, up to 1 million seedlings planted annually just before 1990 when afforestation through planting did increase considerably to 4 million in the 1990s and 5 million in the first seven years of the 2000s. After the financial crisis in 2008 afforestation started to decrease and annual plantation rate was down in 3.3 million seedlings in 2012. From its limited beginnings in 1970, state supported afforestation on farms and private owned land has become the main channel for afforestation activity in Iceland, comprising about 80% of the afforestation effort today.

To distinguish it from natural birch forest, planted or direct seeded forest is named cultivated forest. Naturally propagated forest originating from cultivated forest is also defined as cultivated forest. Estimate of the area of cultivated forest in 2011 is 38 kha. The total area of forest in 2011 is then 133 kha.

5.3.7.2 Methodology

The main source of information used to estimate both area and removals/emissions of GHG regarding forest and forestry is the data sampled in the Icelandic national forest inventory. Other sources are activity data sampled and aggregated at Icelandic Forest Research. More detailed information about methodology and data sources are to be found in the latest National Inventory Report to UNFCCC.

Estimates of historical figures for area and removals/emissions of biomass are different for cultivated forest and natural birch forest. For cultivated forest the growth of living trees is used to measure the annual increase in biomass and the addition in form of new sample plots as an increase in area. For natural birch forest the differences in area and biomass between two survey periods are used to estimate mean annual rate of increased biomass and area (interpolation).

Both methods used to estimate biomass are defined as Tier 3 approaches.

Moreover different methods are used to project future removals/emissions of biomass for these two forest categories.

A model with a main input of annual seedlings planted, split between different tree species with different growth rates, is used to predict change in biomass stock and annual stock changes. A similar model is used to predict wood removals as a result of harvesting both by thinning and clear cut. Both models have been calibrated according to reported figures in the last submission to the UNFCCC.

For the natural birch forest an extrapolation of the mean annual increase was used to forecast both area and biomass stock changes.

Other stock changes connected directly to predicted forest area are soil and litter estimates. They are country wise fixed removals/emission factors (Tier 2 approaches). Factors for mineral soils and litter are only used for the conversion period of 50 years for Other land to Forest land.

The only IPCC default emission factor used, applying a Tier 1 approach, is for C-emissions from drained organic soils. It is not limited to the conversion period.

Stock changes that are not directly dependent on activity level are the use of N-fertilizer and wood removals. Historical estimates are used as activity data and defined as Tier 3 approaches.

5.3.7.3 Prediction assumptions

- ***Afforestation, reforestation and deforestation (ARD)***

1. The rate of afforestation in cultivated forest will be on a similar level as was reported in 2012 or 3.38 million seedlings annually equal to 1.08 kha. That means that the decrease in funding that has been ongoing since 2008 is assumed to halt and regress a bit.
2. The ratio of afforestation on different land use categories will be as it was in the 2011 estimate in the last submission to the UNFCCC.
3. The relative emission effect of annual deforestation in relation to net-sequestration will be the same as in the 2011 estimate in the last submission to the UNFCCC.
4. The use of N-fertilizer per area unit afforested will be equal to the 2011 estimate in the last submission to the UNFCCC.
5. The afforestation and Carbon sequestration rate of natural birch forest will be the same as it was estimated for the time period 1990 to 2011.
6. Growing stock available for wood supply does exclude cultivated birch forest (protection afforestation) and 30% of other species.

- ***Forest Management (FM)***

1. With regard to the prediction for wood removal in the period 2012 to 2020 the same figure is used as in the report “Prediction of Reference Level for the Period 2013-2020 for Forest Management in Iceland”, where Forest Management Reference level was estimated and reported.
2. As mentioned above for ARD does growing stock available for wood supply exclude cultivated birch forest (protection afforestation) and 30% of other species in the model used for the period 2021 to 2030.
3. The Carbon sequestration rate of natural birch forest will be the same as it was estimated for the time period 1990 to 2011.

5.3.7.4 Results

The projected development of afforestation and deforestation area along with corresponding emissions and removals are shown in Table 5.19. Figures to 2011 are as reported in Iceland´s last submission to the UNFCCC. Figures for the period 2012 - 2030 are predictions built on models, methods and assumptions already described.

Table 5.19 Area, emissions and removals from afforestation and deforestation for selected years from 2008-2030. Positive values denote removal, negative values emissions.

Activity	**Specification**	**Parameter**	**Unit**	**2008**	**2011**	**2015**	**2020**	**2030**
Afforestation	Cultivated forest	Area since 1990	kha	27.21	32.20	36.49	41.86	52.60
Afforestation	Cultivated forest	Removal biomass /soil/litter	Gg CO_2-eq	82.46	138.63	176.51	234.95	336.80
Afforestation	Cultivated forest	Emissions organic soil	Gg CO_2-eq	-1.53	-1.67	-1.89	-2.17	-2.72
Afforestation	Cultivated forest	Emissions N-fertilizer	Gg CO_2-eq	-0.11	-0.13	-0.11	-0.11	-0.11
Afforestation	Cultivated forest	Emissions wood removals	Gg CO_2-eq.	0.00	0.00	-5.37	-3.11	-20.45
Afforestation	Cultivated forest	Net removals	Gg CO_2-eq	80.82	136.83	169.14	229.56	313.52
Afforestation	Nat. birch woodland	Area since 1990	kha	7.87	9.11	10.76	12.83	16.97
Afforestation	Nat. birch woodland	Removal biomass /soil/litter	Gg CO_2-eq	22.43	25.97	30.69	36.59	48.39
Deforestation	Forest land	Area since 1990	kha	0.04	0.05	0.07	0.10	0.16
Deforestation	Forest land	Emissions biomass /soil/litter	Gg CO_2-eq	-0.08	-0.46	-0.41	-0.48	-0.63
ARD	Forest land	Net removals	Gg CO_2-eq	103.16	162.34	199.42	265.67	361.29

Figure 5.10 shows a condensed version of projection results reported in Table 5.19 for illustrative purposes. Only total net removals from cultivated forests and natural birch woodland are shown. Deforestation is not shown because of the comparative insignificance of emissions. The graph illustrates that a slowdown in the annual area increase of cultivated forests leads to an immediate slowdown of net removals. The annual net removal increase from cultivated forests slows down even more with time because of the increasing significance of wood removals until it starts decreasing in 2030.

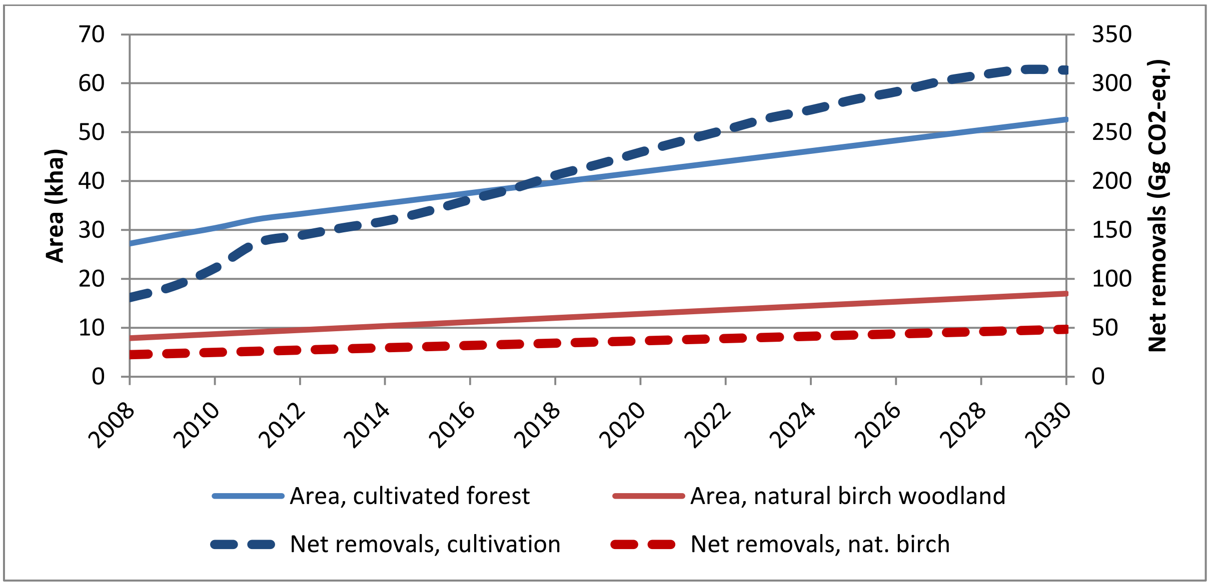

Figure 5.10 Area and net removals of cultivation forests and natural birch woodlands. Net removals are plotted against the secondary axis.

Table 5.20 shows the areal extent and net removals from forests falling under Forest Management.

Table 5.20 Areal extent and net removals from forests falling under Forest Management.

Specification	**Parameter**	**Unit**	**2008**	**2011**	**2012**	**2013-2020**	**2021-2030**
Cultivated forest	Area before 1990	kha	5.72	5.72	5.72	5.72	5.72
Cultivated forest	Net removals	Gg CO_2-eq	59.26	73.10	72.27	69.51	57.57
Nat. birch woodland	Area before 1990	kha	86.40	86.40	86.40	86.40	86.40
Nat. birch woodland	Net removals	Gg CO_2-eq	14.64	14.68	14.68	14.68	14.68
Cultivated forest	Revised reference level	Gg CO_2-eq				84.19	72.24

5.3.7.5 Sensitivity of predictions

- ***ARD***

The key drivers for changes in net carbon sequestration of the afforestation areas are changes in annual afforestation of cultivated forest. Changes in plantation rate will instantly affect C-removal to litter and soil and trigger a slowly increasing influence of C-removal to biomass which in the long run will be the main sink of carbon.

Carbon removals to natural birch forest are much smaller or 19% of the removals to the cultivated forest. Sources of emissions are just sporadic in relation to removals. An increasing and dominating source of emissions will be the wood removals that are predicted to increase from zero in 2011 to 6% of the removals from the cultivated forest in 2030 as thinning will start in part of these forests.

- ***FM***

The biggest class is as for ARD the carbon sequestration in biomass, soil and litter of the cultivated forest. As shown in Table 5.19 it will start to culminate in the beginning of the prediction period. The wood removals do accelerate this tendency although it is growing slowly and unregularly in the period.

5.3.7.6 Comparing methods and results to Iceland´s Fifth National Communication

Since Iceland´s Fifth National Communication on Climate Change under the United Nations Framework Convention on Climate Change was published in 2010 both data and methodology have been improved a great deal. Four more years of data from the national forest inventory together with new estimates of the area and biomass of natural birch forest and result from research regarding sequestration in mineral soil and litter are all milestones of improvements reached since last National Communication report.

- ***ARD***

Comparing results shows that the current predictions are a bit higher than the old one or 266 Gg CO_2 equivalents of net removals in 2020 instead of 220 Gg despite the activity level of predicted afforestation (BAU) has been dropped from 1.8 kha annually to 1.08 kha. The main reason for the higher prediction is that the removal from afforestation of the natural birch forest was excluded in the old prediction but is now included. Wood removals on the other hand were not included so that the comparable prediction value is only 6% higher now than in the 5th national communication.

- ***FM***

As FM was not elected in the current commitment period no prediction of FM can be found in the last National Communication report. On the other hand predictions of FM was done in a report from 2011, named “Prediction of Reference Level for the Period 2013-2020 for Forest Management in Iceland” and delivered to UNFCCC. Predictions of net removals of the cultivated forest are similar in this report and the Reference Level Report. The net removal prediction of the natural birch forest is totally different. The main reason is a new estimation method for the natural birch forest that was used for the first time in the last NIR of Iceland.

5.3.8 Revegetation

5.3.8.1 Methodology

The Soil Conservation Service of Iceland (SCSI) was established in 1907. Its main purpose is the prevention of on-going land degradation and erosion, the revegetation of eroded areas, restoration of lost ecosystem and to ensure sustainable grazing land use. Revegetation activities before 1990 involved spreading of seeds and/or fertilizer by airplanes and direct seeding of Lyme grass (Leymus arenarius L.) and other graminoids. Since then these methods have been replaced by other methods, such as increased participation and cooperation with farmers and other groups interested in land reclamation work. The SCSI keeps a national inventory on revegetation areas since 1990 based on best available data. The detailed description of methods will be published elsewhere (Thorsson et al. in prep.). Activity data regarding revegetation stems from the National Inventory on Revegetation Area (NIRA), which is based on systematic sampling on predefined grid points in the same grid as is used by the Icelandic Forestry Service (IFS) for NFI (Snorrason and Kjartansson, 2004[4]) and in the Icelandic Geographic Landuse Database (IGLUD) field sampling (Guðmundsson et al., 2010[5]).

Carbon stock changes of land subject to revegetation are estimated applying IPCC 2006 GL Tier 2 methodology in combination with country specific emission factors. The Soil Conservation Service of Iceland records the revegetation efforts conducted. A special governmental program to sequester carbon with revegetation and afforestation was initiated in 1998-2000 and has continued since then. A parallel research program focusing on carbon sequestration rate in revegetation areas was started the same time. The contributions of living biomass (including dead organic matter) and soil to total changes in carbon stock were estimated as 10% and 90%, respectively, based on the above mentioned studies.

CS emission factors for C-stock changes in living biomass (including dead organic matter) and mineral soils of land subject to revegetation were estimated based on preliminary results from the NIRA. They were -0.06 and -0.51 t C/ha/yr, respectively. All revegetated areas 60 years old or less are assumed to accumulate carbon stock at the same rate.

5.3.8.2 Key drivers and respective key assumptions

The EF for annual CO_2 removal per ha is assumed constant. The trend in CO_2 removal from revegetation is therefore almost exclusively dependent on the development of revegetation area since 1990. Area losses since 1990 of area revegetated before 1990 only play a minor role. Therefore, no further losses of area revegetated before 1990 are assumed in this

[4] Skógræktarritið (2): 101-108 (In Icelandic)

[5] The Icelandic Geographic Land Use Database (IGLUD). Mapping and monitoring of Nordic Vegetation and landscapes. Hveragerði, Norsk Insitute for Skog og landskap.

projection. Figure 5.11 shows that the annual increase of revegetation area peaked in 2004 when it was almost 7 kha. Since then it declined due to decreasing funds. The average area subject to revegetation activities during the period 2009-2011 was 3.7 kha. A part of these activities was paid for by special funds in the wake of the Eyjafjallajökull and Grímsvötn volcano eruptions. The annual revegetation area increase for the projection period from 2012-2030 is assumed constant at 2.5 kha per year based on the area subject to revegetation from 2009-2011 minus the portion paid for by above mentioned special funds. This leads to a slowdown of CO_2 removal from revegetation: the average annual net removal from 1990-2011 amounted to 8.3 Gg CO_2 per year whereas the projected annual removal from 2012-2030 is 5.2 Gg CO_2 per year (Fig. 5.11).

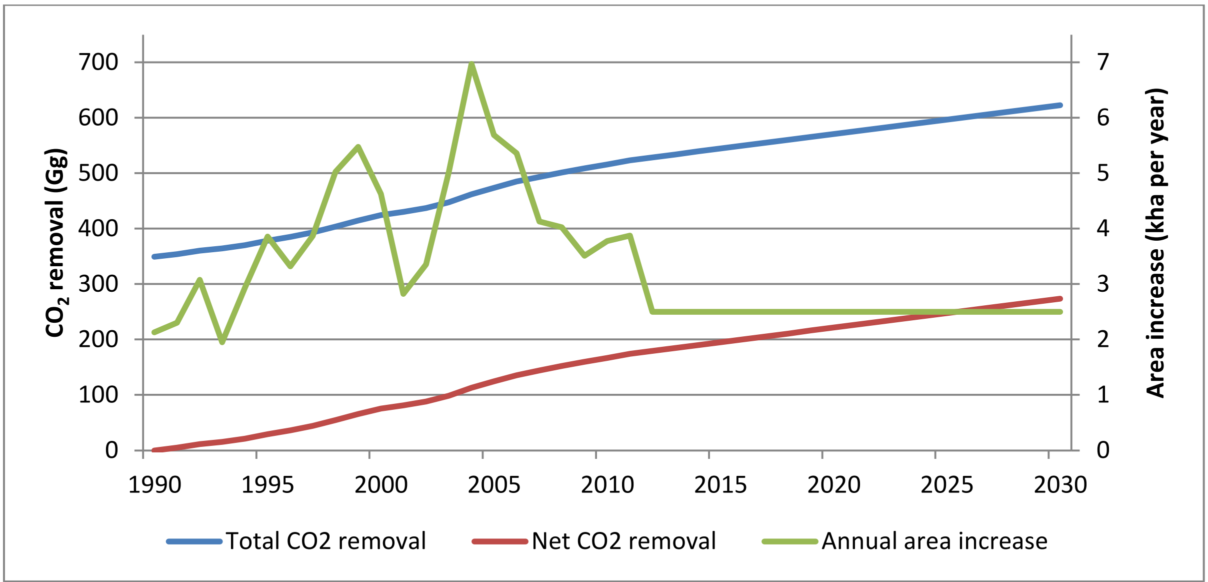

Figure 5.11 Total annual CO_2 removals from revegetation, net annual removals from revegetation and annual increase of revegetation area.

Net removals from revegetation amounted to 174.3 Gg CO_2 in 2011. It is projected that these removals will increase linearly until 2030 when they will reach 273.6 Gg CO_2.

5.3.8.3 Sensitivity of projections

The projected annual increase of removals from revegetation is sensitive to two factors: the annual increase in revegetation area and the development of emission factors. Additional funding would lead to an increase in activity area and thus to increasing CO_2 removal estimates. The ongoing processing of samples taken during the NIRA will increase the accuracy of carbon stock change factors of biomass and soil. Further research might also produce knowledge on the development of CO_2 removals from revegetation over time which could lead to time dependent emission factors.

5.3.8.4 Changes to NC5

In the NC5 estimated net removals from revegetation amounted to 555 Gg CO_2 in 2020, twice as high as the current projection (274 Gg CO_2). The reason for this difference lies mainly in the difference in annual revegetation area increase. The increase projected in the NC5 was 7.5 kha/yr compared to 2.5 kha/yr in the current estimate. Another reason is that the factor for annual removal rate per hectare has been changed from 2.75 CO_2/ha to 2.09 tons CO_2/ha. The new factor is based on more samples taken during the NIRA and more careful interpretation, i.e. towards the lower end of the confidence interval.

6 Impacts and adaptation measures

6.1 Impacts on climate

6.1.1 Observed variability

Temperature in Iceland exhibits large inter-decadal variations. The longest continuous temperature record comes from Stykkishólmur on the west coast of Iceland. Statistical treatment of data from this station and of non-continuous measurements at other locations in Iceland, allows this record to be extended back to 1798 (Fig 6.1). This record shows that during the 19th century temperatures were cooler than in the 20th century, and the magnitude of inter-annual variations in temperature was larger. In the 1920s there was a period of rapid warming, similar to what is observed in global averages, but in Iceland the temperature change was greater and more abrupt. From the 1950s temperatures in Iceland had a downward trend with a minimum reached during the years of Great Salinity Anomaly in the late 1960s, when sea ice was prevalent during late winter along the north coast. Conditions were rather cool in the 1970's with 1979 being the coldest year of the 20th century in Iceland. Since the 1980's, Iceland has experienced considerable warming, and early in the 21st century temperatures reached values comparable to those observed in the 1930s. From 1975 to 2008 the warming rate in Iceland was 0.35°C per decade, which is substantially greater than the globally averaged warming trend (~0.2°C per decade). However, the long term warming rate in Iceland is similar to the global one, suggesting that the recent warming is a combination of local variability and large scale background warming.

In Reykjavík, 2013 was the 18th consecutive year with temperatures above the 1961 - 1990 average and the 13th consecutive year warmer than the 1931 - 1960 average.

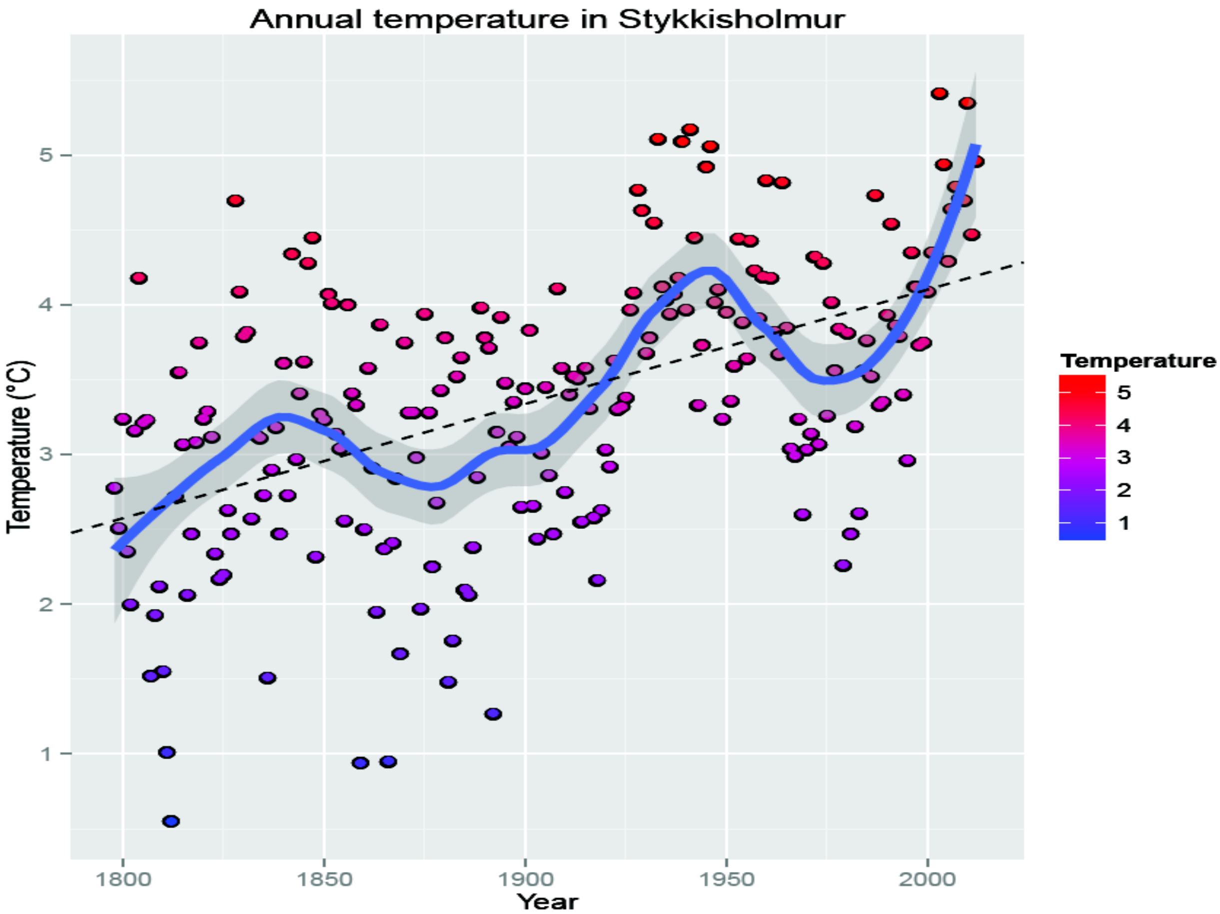

Figure 6.1 Mean annual temperature at Stykkishólmur 1798 - 2013. Prior to 1850 the data is a composite of measurements in Reykjavik and Stykkishólmur, and prior to 1824 several other stations are used in the composite. The composite data are less reliable. Also shown is a trend lines for the entire period (slope 0.7°C/century) and, to facilitate visualization, a loess smoother that tracks inter-decadal variability.

Decadal variations in precipitation are also significant in Iceland. Continuous precipitation records extend back to the late 19th century, but precipitation has been measured at several stations since the 1920s. The station network, however, had insufficient coverage in the highlands in Iceland where precipitation is greater than in lowland areas. Recently a precipitation record for the whole of Iceland during the latter half of the 20th century has been established using a high resolution statistical dynamical model for orographic precipitation and atmospheric reanalysis. The results show significant decadal variations in precipitation, and a tendency for higher amounts of precipitation during warmer decades. The long term station records indicate that precipitation tends to increase by 4% to 8% for each degree of warming.

6.1.2 Climate projections

Based on the results of the Climate models, the warming observed is expected to continue. The warming rates differ between emission scenarios and between models. An analysis of the IPCC SRES A1B scenario for many models showed that in the next decades the warming in Iceland is likely to be in the range of 0.2 - 0.4 degrees per decade and that precipitation increase would be about 1% per decade. However, as described above, inter-decadal variations in temperature and precipitation are significant and the projected changes in temperature and precipitation, may in some periods be masked by natural inter-decadal variability.

Figure 6.2 shows the results of comparing the results of an ensemble of coarse grid global climate models (GCMs) with the results of three high resolution regional climate models (RCMs). While the warming rates in the RCMs are similar to the warming rates in the GCM ensemble, the RCMs show large fluctuation from decade to decade.

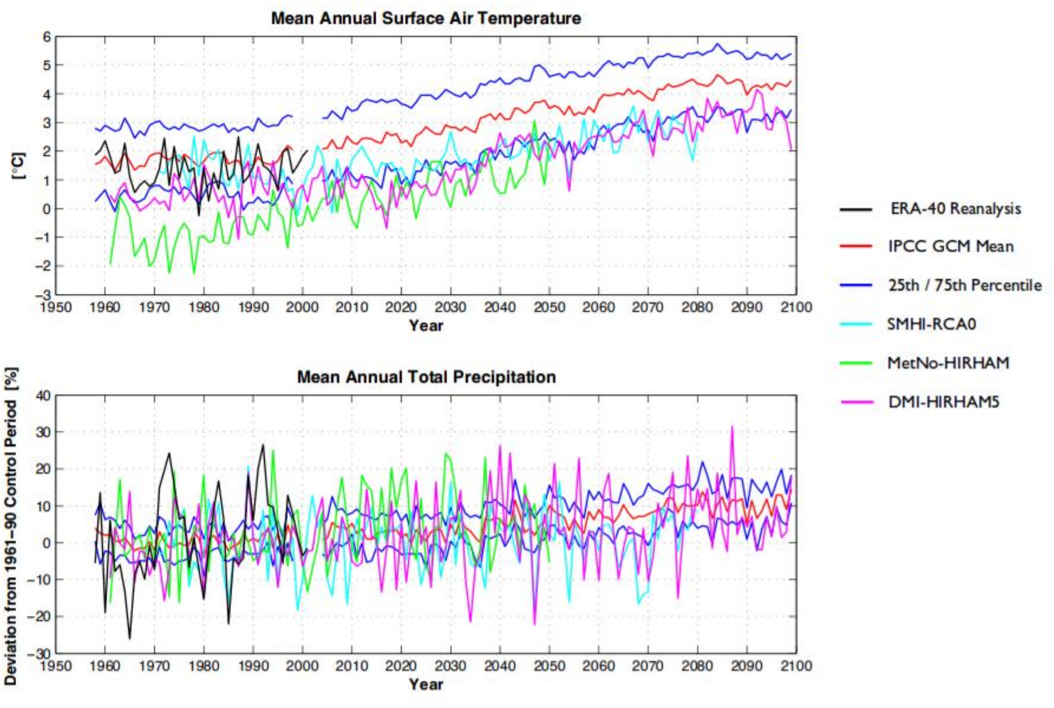

Figure 6.2: Estimated warming and precipitation change for Iceland in the 21st century. Shown are the results from a multi model comparison, including three high resolution regional climate models.

6.2 Impacts on oceanic currents

The climate of Europe and the North Atlantic is much milder than it is at comparable latitudes in Asia and North America. This is due to the heat transport from the south with air and water masses. A key process in this respect is the so-called Meridional Overturning Circulation (MOC) in the North Atlantic. This circulation is due to sinking of seawater, because of cooling of surface water and ice formation in high latitudes. After sinking this water is called deep water and it subsequently flows in the deep to southern latitudes. In the North Atlantic huge amounts of deep water is formed, e.g. in the Arctic Ocean, the Greenland Sea, the Iceland Sea and the Labrador Sea. The deep water that is formed north of the Greenland-Scotland Ridge flows over the submarine ridges on both sides of Iceland and also through the Faroe-Shetland Channel.

Many numerical models predict that the production of deep water will be reduced as a result of increasing greenhouse gas emissions. This happens when more fresh water is introduced to the Nordic Seas because of melting of glaciers, thawing of permafrost and increased precipitation that will make the surface layers fresher and therefore reduce the likelihood of convection. This in turn would lead to reduced deep water flow over the Greenland-Scotland ridge and a compensating reduction of flow of warm currents into the Nordic Seas thus inducing a relative cooling in the area. Ice core data from the Greenland Ice Sheet seem to indicate that this can happen rather quickly or within decades. Research projects measuring changes in the deep water fluxes over the ridges have succeeded in obtaining a time series of the flux of Atlantic water as well as of the deep water. With the time series available now it is, however, not possible to conclude that the flow of deep water is decreasing. In the fourth assessment report of the IPCC (2007) it was concluded that while it was "very likely that the MOC will slow down during the course of the 21st century", it was also "very unlikely that the MOC will undergo a large abrupt transition during the course of the 21st century". The slowdown of the MOC may reduce the warming rate near Iceland but is not likely to halt the warming or reverse it.

6.3 Impacts on marine ecosystems and fish stocks

To project the effects of climate change on the marine ecosystem is a challenging task. Available evidence suggests that, as a general rule, primary and secondary production and thereby the carrying capacity of the Icelandic marine ecosystem is enhanced in warm periods, while lower temperatures have the reverse effect. Within limits, this is a reasonable assumption since the northern and eastern parts of the Icelandic marine ecosystem border the Polar Front. In cold years the Polar Front can be located close to the coast northwest to northeast Iceland. During warm periods it occurs far offshore, when levels of biological production are enhanced through nutrient renewal and associated mixing processes, resulting from an increased flow of Atlantic water onto the north and east Icelandic plateau.

Over the last few years the salinity and temperature levels of Atlantic water south and west off Iceland have increased. At the same time, there have been indications of increased flow of Atlantic water onto the mixed water areas over the shelf north and east of Iceland in spring and, in particular, in late summer and autumn. This may be the start of a period of increased presence of Atlantic water, resulting in higher temperatures and increased vertical mixing over the north Icelandic shelf. The time series is still too short though to enable firm conclusions. However, there are many other parameters which can affect how an ecosystem and its components, especially those at the upper trophic levels, will react to changes in temperature, salinity, and levels of primary and secondary production. Two of the most important are stock sizes and fisheries, which are themselves connected.

To large extent the response of commercial fish stocks to a warming of the marine environment around Iceland has been similar to that which occurred during the warming between 1920s and 1960s. Thus during recent warm period since 1996 marked changes have been observed in the distribution of many fish species during this warm period. Southern commercial species have extended farther north (e.g. haddock, monkfish, mackerel), a northern species is retreating (capelin), rare species and vagrants have been observed more frequently (e.g. greater fork beard, blue antimora, snake pipefish, sea lamprey, Ray's bream), and 31 species, from both shelf and oceanic waters, have been recorded for the first time since 1996. In general a moderate warming is likely to improve survival of larvae and juveniles of most southern species and thereby contribute to increased abundance of commercial stocks. The magnitude of these changes will, however, be no less dependent on the success of future fisheries management aiming long term sustainable level for all commercial species.

The Marine Research Institute and the University of Iceland conduct studies on sea water carbonate chemistry and the air-sea flux of carbon dioxide. Research on seasonal biogeochemical processes enables evaluation of the magnitude of the ocean carbon dioxide sink and its relation to oceanographic conditions. The North Atlantic Ocean is overall a strong sink for carbon dioxide but it is, however, evident that the conditions are both regionally variable and changing in response to rising atmospheric carbon dioxide.

There are long term time series from quarterly observations, since 1983, of ocean carbon dioxide at two sites near Iceland which differ significantly in oceanographic characteristics. The time series are invaluable for assessing long term trends and rates of change. They reveal rapid ocean acidification in the Iceland Sea at 68°N. The surface pH there falls 50% faster than is observed in the sub-tropical Atlantic. The rapid rate of change is because the Iceland Sea is a strong sink for carbon dioxide and the sea water is cold and relatively poorly buffered. The sea water calcium carbonate saturation state is low in these waters and it falls with the lowering pH. The calcium carbonate saturation horizon which lies at about 1700 m is shoaling which results in large areas of sea floor becoming exposed to undersaturated waters with respect to aragonite (calcium carbonate). At shallower depths the sea water saturation state is falling with unknown consequences for benthic calcifying organisms.

The biological effects and ecosystem consequences of the carbonate chemistry changes are of concern and are being studied.

6.4 Impacts on glaciers

Glaciers are a distinctive feature of Iceland, covering about 11% of the total land area. The largest glacier is Vatnajökull in southeast Iceland with an area of 7,800 km^2. Climate changes are likely to have a substantial effect on glaciers and lead to major runoff changes in Iceland. The changes in glacier runoff are already substantial and expected to increase in the future and they are one of the most important consequences of future climate changes in Iceland. The runoff increase may, for example, have practical implications for the design and operation of hydroelectric power plants.

Rapid retreat of glaciers does not only influence glacier runoff but leads to changes in fluvial erosion from currently glaciated areas, and changes in the courses of glacier rivers, which may affect roads and other communication lines. A recent example of this is the change in drainage from Skeiðarárjökull, a southflowing outlet glacier from Vatnajökull ice cap. Due to thinning and retreat of the glacier the outlet of the river Skeiðará moved west in 2009 along the glacier and the river merged into another river, Gígjukvísl. As a consequence little water now flows under the bridge over Skeiðará, the longest bridge in Iceland. In addition, glacier melting is of international interest due to the contribution of glaciers and small ice caps to rising sea level. Regular monitoring shows that today, all non-surging glaciers in Iceland are retreating (Fig 6.3).

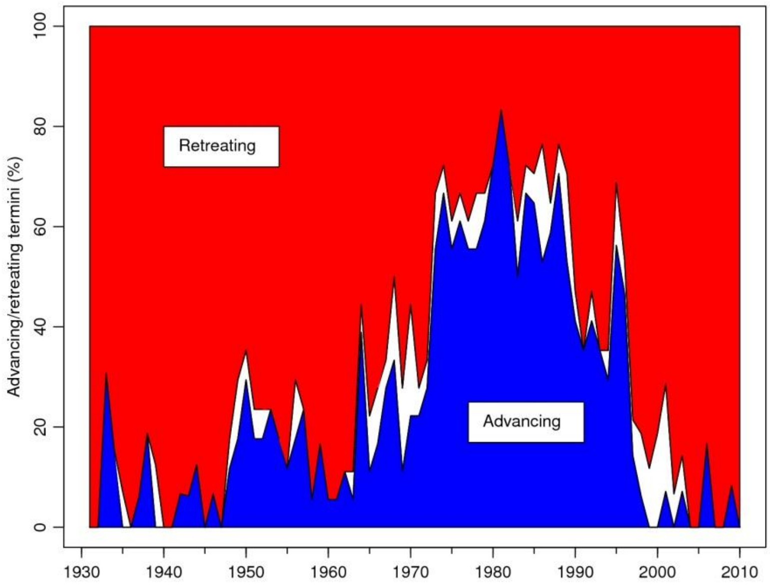

Figure 6.3: The fraction of monitored non-surging glacier termini in Iceland from 1930/31 to 2009/10 that are either advancing or retreating. Over most of the period the figure is based on measurements at 15 to 19 locations. From the database of the Iceland Glaciological Society.

Recent airborne lidar measurements of glacier topography show significant amount of thinning in recent years. The picturesque Snæfellsjökull ice cap is the only ice cap that can be seen from Reykjavík. In the 1864 novel Journey to the Center of the Earth, by Jules Verne, the ice cap serves as the entrance to a passage that led to the center of the earth. It has persisted for many centuries, at least since Iceland was settled in the ninth century AD, but recent measurements show that the ice cap, which has an average thickness of less than 50 m, thinned by approximately 13 m in the last decade. At the current rate of thinning it will disappear within the century. Snæfellsjökull is not alone in this regard, other monitored ice caps are also thinning. The larger Hofsjökull ice cap thinned by a similar amount in the last decade (Fig 6.4).

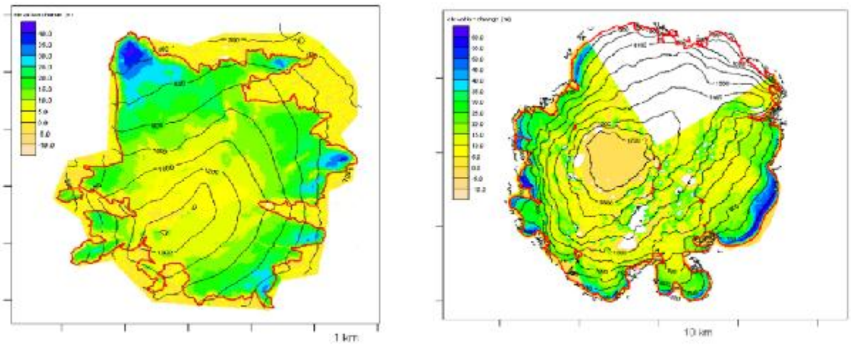

Figure 6.4 Recent thinning of Icelandic glaciers. The left panel shows the thinning of Snæfellsjökull from 1999 to 2008, and the right panel shows results for Hofsjökull from 2004 to 2008. On average both icecaps thinned by about 13 m from 1999 to 2008.

The thinning of large glaciers, such as the Vatnajökull ice cap, one of Europe's largest ice masses, reduces the load on the Earth's crust which rebounds. Consequently large parts of Iceland are now experiencing uplift. The uplift does not, however, reach to the urban south west part of Iceland, where subsidence is occurring (Fig 6.5).

The uplift along the south coast may reduce the impacts of rising global sea levels during the 21st century. If subsidence continues in the south west part of Iceland, it will exacerbate the impact of rising sea levels. Measurements in Reykjavik show that sea level rose by 5.5 mm/year from 1997 - 2007. Once these results have been adjusted to account for local subsidence, sea level in Reykjavik during this period rose by about 3.4 mm/year, which is close to the global sea level rise.

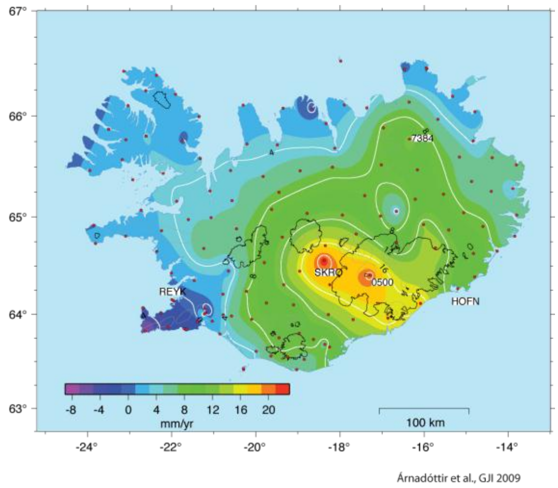

Figure 6.5: Vertical movement of land in Iceland. Much of the interrior and the south eastern coast are experiencing uplift due to glacier thinning.

Modeling of the Langjökull and Hofsjökull ice caps and the southern part of the Vatnajökull ice cap in Iceland reveals that these glaciers may essentially disappear over the next 100–200 years (Fig 6.6). Runoff from these glaciers is projected to increase and usable hydropower from these rivers is expected to increase by 20% until 2050. The current hydro-power system can capture about half of this increase. The peak runoff is expected to occur in the latter part of the 21st century.

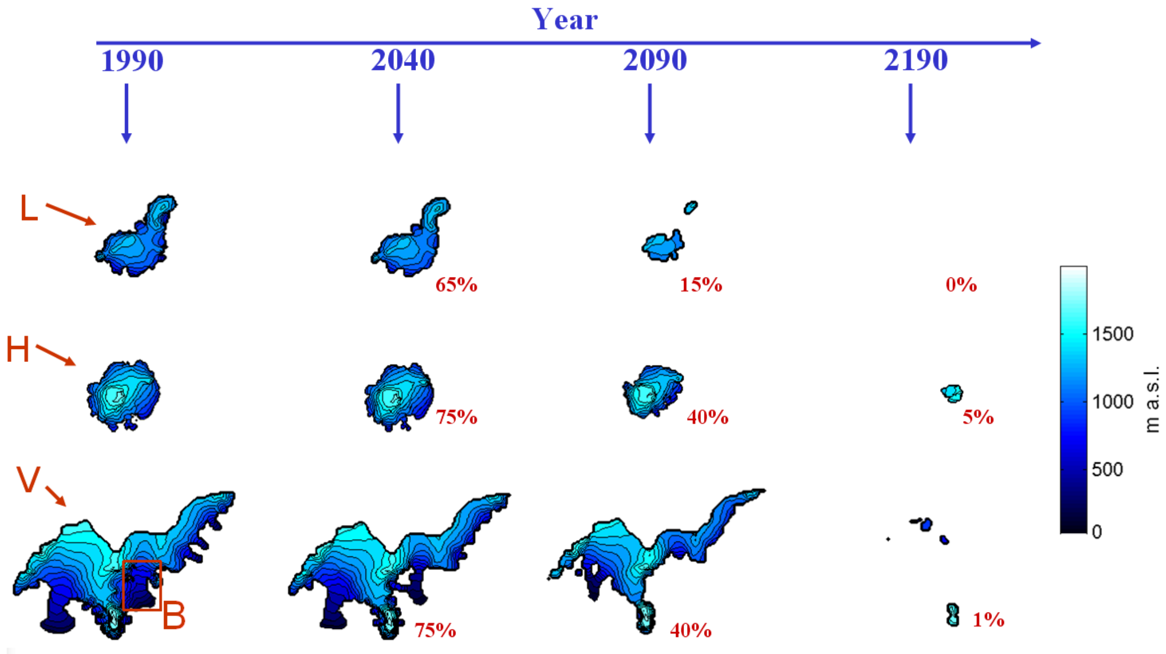

Figure 6.6: Response of Langjökull (L), Hofsjökull (H) and Southern Vatnajökull (V) to a climate warming scenario. The outlet glacier Breiðármerkurjökull on the south flank of Vatnajökull is indicated with a rectangle marked B in the left most map of Vatnajökull. The inset numbers are projected volumes relative to the initial stable glacier geometries in 1990. Note that Vatnajökull is only modeled south of the main east-west ice divide.

Although glaciers and ice caps in Iceland constitute only a small part of the total volume of ice stored in glaciers and small ice caps globally, studies of their sensitivity to climate changes have a general significance because these glaciers are among the best monitored glaciers in the world. Field data from glaciated regions in the world are scarce due to their remote locations and difficult and expensive logistics associated with glaciological field work. Results of monitoring and research of Icelandic glaciers are therefore valuable within the global context, in addition to their importance for evaluating local hydrological consequences of changes in glaciated areas in Iceland.

Studies on regional sea level rise indicate that the sea level rise in Iceland may be quite different from the global average. The main reason for this is that the melting of the Greenland ice sheet will affect the gravitational field around Greenland in a way that, with other things being equal, would lower sea level in the vicinity of Greenland. This effect can be calculated given assumptions about glacial melt, and its "fingerprint" mapped. When other changes, such as the thermal expansion of the oceans and the residual isostatic adjustment from the last glaciation are factored in, sea level in the vicinity of Greenland does actually rise, but less than would be estimated without the fingerprint.

Figure 6.7 shows results of such calculations (adapted from Spada et al 2013) for the northern

North Atlantic. Shown are results for a scenario where the global sea level rise is 61 cm, resulting from thermal expansion and the melting of ice sheets and glaciers. The fingerprint of changes in the gravitational field due to ice melt result in a reduction of sea level rise around Iceland by 10 - 20 cm. When other effects are factored in, the regional sea level rise around Iceland is about 30 - 35 cm in 2100. If the coastal subsidence and uplift shown in figure 6.5 are extended towards the end of the century, the relative sea level rise in Reykjavik approaches 60 cm but along the south coast of Iceland the uplift is fast enough to out-pace the regional sea level rise. Methods to estimate regional sea level rise is currently a very active research topic, and results are not yet robust enough.

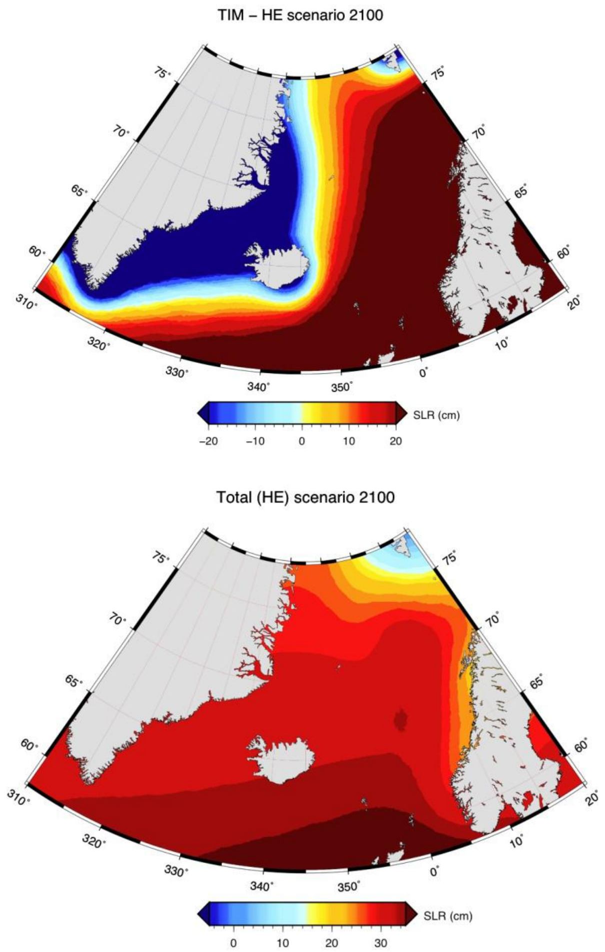

Figure 6.7: Sea level rise in the northern North Atlantic by 2100 in a scenario where global sea level rises by 61cm and assuming a certain distribution of glacier and ice sheet melt.Left, the fingerprint of gravitational changes due to ice melt around Greenland and Iceland and right, the regional sea level rise once isostatic adjustment and thermal expansion is factored in. Adapted from Spada et al. (2013).

6.5 Impacts on forests, land management and agriculture

In 2008 an expert panel appointed by the Ministry for the Environment published a scientific report on global warming in Iceland. It summarized the present knowledge on how nature and society have responded to past climate fluctuations and predicted how future climate change is likely to impact both nature and society. Climatic factors, such as temperature, precipitation, wind and seasonality, greatly influence plants and vegetation cover and therefore have a direct impact on agriculture and forests.

Mean annual temperature has risen by ca. 1.2 °C compared to what it was on average during the 1961-1990 period, These and other accompanying changes have already had a substantial impact on agriculture and forest growth in Iceland. Traditional agriculture in Iceland is based on animal husbandry and hey-production for winter fodder. Long-term studies on past climate variability have shown that a rise in spring temperature by 1°C increases annual hay production by 11%. Frosts frequently damaged hayfields in many parts of Iceland, especially during the cold period in the 1960s-80s, reducing the potential hay production by 20-30% when it happened. This problem has now largely disappeared in the warmer winter climate of the 2000‘s. However, even if it has warmed on average, then the high climate variably in Iceland may still cause serious problems. An untimely snowstorm in early September 2012 caused for example losses of large number of sheep in N-Iceland. Such climate-related catastrophes are not expected to decrease in the future and the high climate variability will continue to challenge traditional agriculture.

Barley production has increased much in Iceland during the past two decades, both because of research and development within the country and changing climate. Barley needs ca. 1200 day degrees (d.d.) during the growing season to be usable as animal fodder and 1300-1500 d.d. to fully develop. Barley production increases by ca. 1 t/ha for each 1 °C increase in temperature when grown between these limits. Much larger part of Iceland is now found within these limits than 20-30 years ago. The change in climate has also made it possible to grow new crops, such as rapeseed and winter wheat, that are now grown in the country‘s warmest areas.

An analysis of the possible impact of climate change on agriculture, forestry and land use was last made in 2004. It used a scenario derived from a Nordic study on climate change in the North Atlantic region, assuming that in the year 2050 the mean temperature would have increased by 1.5 °C in the summertime and by 3.0 °C over the wintertime, and that precipitation would increase by 7.5% in summer and 15% in winter. The following paragraphs are mostly based on this analysis and describe the changes that were predicted to occur, given these assumptions.

The production of hey per unit area could significantly increase, up to 64%. This would partly be due to a direct effect of increasing concentrations of carbon dioxide (CO_2) in the atmosphere on production, but mostly due to longer growing seasons, higher temperatures and less damage by winter frosts. The effects of the climate warming would be greatest on cereals.

The harvest of barley could increase where presently grown and basically all Icelandic lowlands would become suitable for successful barley production. An increase of average summer temperatures by 1.5 °C would also open up the possibility of successfully growing many new crops on wider acreage, including oats, rapeseed and wheat, even rye. Harvest of potatoes, turnips, carrots and other vegetables grown outdoors in Iceland today, would increase. Increased cloud cover and summer precipitation could, however, lead to less inputs of solar light. This could increase the cost of lighting in greenhouses. Pests and plant diseases would also become more of a problem for outdoor crops in warmer and more humid climate than currently, and the use of pesticides could possibly increase. This could challenge the image of the Icelandic agricultural produce as unpolluted high-quality foodstuffs. Climate change will make the cultivation of many areas more feasible and new species like barley previously difficult to grow more profitable. This might cause a shift in utilization of cultivated land and/or increase pressure on cultivating new areas.

Impacts of warmer climate on animal husbandry would mostly be positive. In addition to increased production of crops for fodder, wild grazing plants should also benefit from higher summer temperatures and increased precipitation. If this would result in an increase in animal numbers, that will increase the GHG emissions from the agricultural sector. The time available for grazing would increase and the need for sheltering livestock during winters would decrease. Winter grazing is more damaging to vegetation than summer grazing, and this could therefore have some potential negative effects if not managed in a sustainable way. A recent study (2006) showed indeed that natural grassland production in N and S Iceland has been increasing during the past decade. It was, however, difficult to determine the main cause for this change; it could both be change in climate and/or a change in grazing pressure.

An increase in summer temperatures and the length of the growing season will doubtlessly increase annual growth rates and coverage of both natural and managed forests in Iceland. It was recently shown that the downy birch treelines are generally moving upwards in Iceland and its growth rate close to the treelines has increased manifold since in the 1970s. An experimental study in southern Iceland showed that growth rates of black cottonwood were increased by 9-15% by 1.2 °C rise in mean growing season air temperature, where trees growing in infertile soils were benefitted relatively more. Similarly, a recent study (2013) on the effects of rising soil temperatures has shown that Sitka spruce continued to increase its growth rate until mean annual temperatures exceeded 10°C, which is ca. a doubling of the current temperature regime. An increase in winter air temperature could, however, do more damage than good, especially for exotic tree species used in managed forests and as ornamental garden plants originating from cold and continental climates. Those are generally not well adapted to mild, oceanic, winter climate. Further winter warming could thus lead to untimely start of tree growth in late winters or early springs, with increased danger for frost damage. On the other hand severe frost periods in the spring will decrease drastically because of higher ocean temperature in the Arctic Ocean north of Iceland.

During the past two decades, an increasing number of new pests have emerged that can cause damage to trees. A recent analysis (2013) has shown that now (1995-2012) the colonization rate of new pests on woody plants is the same as during the last warm period between 1940-1960, while the colonization rate was significantly reduced during the cold period of 1960-1995. Further warming is expected to increase the vigor and number of new pests. Special concern is paid to the natural woodlands of downy birch. Severe, repeated defoliation by both native and alien insects have occurred to a large extent in the 2000s, leading to permanent erasure of the woodlands in a few cases. The overall effect on forest propagation and production is, however, expected to be positive, which again might enhance the afforestation of new areas and utilization of forests as a natural resource.

6.6 Impacts on terrestrial ecosystems

Iceland‘s natural terrestrial ecosystems can be roughly divided into four main categories; wetlands, woodlands, grasslands, and barren or sparsely vegetated areas. Effects of warmer climate on most terrestrial ecosystems in Iceland are not expected to differ from those earlier described for forests. As for the managed ecosystems, the warmer climate is likely to extend the length of the growing season and increase plant production. Higher winter temperature is also likely to stimulate decomposition of litter and soil organic matter and thereby mineralization of nutrients, with more available for plant growth. These changes will have effects on the function, structure and distribution of terrestrial ecosystems. Similar changes are expected in Iceland as in other parts of the high-boreal, sub-arctic and arctic areas, as described e.g. in the ACIA 2005 report and in the IPCC‘s 4th Assessment Report from 2007.

Many areas in Iceland have suffered from extensive historic vegetation change and soil erosion due to, among other factors, heavy livestock grazing and periods of cold climate. The grazing pressure on many areas has decreased and one effect of the warmer climate is to enhance reestablishment of former vegetation and productivity of many of these areas. Indeed it was recently shown (2011) that satellite-based vegetation index (NDVI) of the whole country during the period 1982-2010 has increased, especially after 2000. It has been concluded that vegetation of sparsely vegetated or barren areas should mostly benefit from warmer climate; at least if changes in precipitation patterns do not counteract its effects. Increased precipitation could lead to increased water erosion of barren soils.

The prediction of higher production of Icelandic plant communities in future climate was, however, only partly confirmed by the ITEX-project (International Tundra Experiment). It experimentally simulated during 3-5 years a climate warming of 1-2 °C in two widespread, but contrasting plant communities. A dwarf-shrub heath showed up to 100% increase in height growth, while biomass production in a moss heath was not affected. It was concluded that the sensitivity of Icelandic tundra communities to climate warming varies greatly depending on initial conditions in terms of species diversity, dominant species, soil and climatic conditions as well as land-use history. If, however, some large-scale changes occur in land cover, it would affect distribution and diversity of both flora and fauna, and some rare species might become endangered while other might benefit. Other possible negative impacts of climate change on terrestrial ecosystems include increasing risks of plant diseases and insect pests.

One rare plant community, highland permafrost string bogs (palsamires), is already under threat from the recent climate warming. The string bogs and their discontinuous permafrost areas might even disappear with further warming. Then their function as important habitats for plants and as breeding ground for birds would disappear as well. The permafrost string bogs hold much soil organic matter that currently is unavailable to decomposition. The thawing of these soils could therefore result in more emissions of GHGs.

Decomposition of organic matter and the subsequent CO_2 emission rate is primarily temperature controlled, where oxygen can access it. Warmer winters will increase decomposition of organic matter in terrestrial ecosystems, both litter and soil organic matter, and presumably increase the annual release of all GHGs (CO_2, CH_4 and N_2O). How this will affect the annual ecosystem GHG balance depends, however, on how fast and how much the summer carbon uptake (productivity) will be increased due to more plant cover, longer growing seasons, warmer temperatures, and increased nutrient availability in each ecosystem type.

Arctic Fox is the only native land mammal in Iceland. In a recent study (2009) it was shown that its growth and population size has varied with past climate fluctuations, mainly through effects on its food availability. Three bird species have become extinct in Iceland since 1844 but during the same period 14 new bird species have colonized and become regular breeding birds. The climate warming during this period could possibly have influenced one extinction; the Little Auk, which is an arctic seabird. Some of the colonizations could also possibly be linked to warmer climate, especially winter climate. Establishment of new habitats, such as coniferous forests and urban gardens, has also been an important contributing factor. There have been large-scale changes in many seabird colonies of e.g. puffins and guillemots in S- and W-Iceland since 2005. This collapse has been linked to less abundance of their feedstock fish, such as sand eel, in the same region. Oceanic temperatures have steadily risen off the S and W coast of Iceland during the past decades (see 6.3), but it is not fully understood how and if that has affected the population dynamics of the feedstock fish.

There have been some studies that have shown that biogeochemistry of rivers has changed during recent years. The amount of dissolved organic carbon has e.g. increased with increased annual temperature. Salmon has also shown more growth and higher production per unit area in NE Iceland during the past 20 years, which has been related to warmer climate. There are some indications that the Arctic Char, which is a sub-arctic freshwater fish, has been becoming less frequent in shallow lakes in Iceland during the past years. This has been linked to its low optimum temperature, but other factors may also be important. A new fish species, Flounder, has also colonized Icelandic freshwaters in S- and W-Iceland during the last decade and is currently increasing its distribution in N and E Iceland. Previously its northern limits were in the Faeroe Islands. How this will affect the river ecosystems is not known.

7 Financial assistance and transfer of technology

7.1 Iceland's International Development Cooperation

International development cooperation is one of the key pillars of Iceland's foreign policy, and the main goal is to contribute to the fight against poverty in the world's poorest countries. Iceland's membership of the United Nations (UN) is the main foundation for the country's international development cooperation, which is guided by the Millennium Development Goals (MDGs).

The Icelandic government is committed to the UN target of 0.7% of gross national income (GNI) dedicated to official development assistance (ODA), as pledged by developed countries. Iceland's ODA grew significantly from 2006 to 2009, reaching ISK 4.3 billion, or 0.37% of GNI in 2008. However, in the wake of the country's economic crisis, a reduction in all public expenditures could not be avoided, including contributions to development cooperation. Consequently Iceland's ODA was reduced and was 0.35% in 2009 and 0.27% in 2010. In 2011 and 2012, the ODA was 0.21% and 0.22% of GNI respectively. The estimated ODA for 2013 is 0.26% of GNI which corresponds to 4.332 ISK million, representing around 40% increase from 2012.

Iceland endeavours to follow best practices in international development cooperation and important efforts to that end have been made in recent years. The Act on Iceland's International Development Cooperation from 2008 has led to institutional changes that enable the government to start implementing the commitments of the Paris Declaration, the Accra Agenda for Action and the Busan Partnership. Furthermore, the Development Assistance Committee of the OECD (DAC) has conducted a special review of Iceland's development cooperation, followed by Iceland's full membership of DAC in March 2013. In 2012, Iceland furthermore began the process of implementing the OECD DAC statistical reporting methods, including the usage of the Rio markers.

In 2011 the Icelandic parliament adopted a parliamentary resolution on a Strategy for Iceland's International Development Cooperation 2011-2014. The Strategy was reaffirmed by the parliament in March 2013, and extended to cover the period of 2013-2016. The Strategy identifies priority sectors and themes for Iceland's international development cooperation, which are natural resources, human capital and peace-building. Moreover, special emphasis is put on gender equality and environmental sustainability as cross-cutting themes.

According to the Strategy, Iceland's development cooperation is based on the principles of sustainable development. Iceland is committed to environmental sustainability in all its development efforts, which is particularly important in projects that relate to the utilisation of natural resources. In addition, efforts are made to ensure that all development projects take environmental concerns into consideration and are implemented in harmony with the environment. In this way, Iceland's environmental efforts are intended to contribute to meeting the overall goal of Iceland's international development cooperation – combating poverty. This means that environment efforts, including climate efforts, are principally an integrated element of Iceland's international development cooperation.

Iceland‘s climate support for developing countries is managed by two parties: The Ministry for Foreign Affairs and the Icelandic International Development Agency (ICEIDA). In recent years there has been an increased focus on the challenges of climate change within Iceland's international development cooperation, including adaptation of developing countries to climate change, as well as their development towards a low carbon economy. Through international development cooperation, Iceland is helping improve the capacity of developing countries to reduce their emissions and build resilience to climate impacts.

7.2 Provision of 'new and additional' financial resources

Iceland is committed to assist developing countries adapt and mitigate the adverse effects of climate change and in 2012 Iceland contributed approximately 2,4 million US dollars in 'new and additional' support[6]. The new and additional funding was drawn from the growing aid program and has not diverted funds from existing development priorities or programs.

In 2010 the Government of Iceland decided to commit 1 million US dollars to Fast Start Financing to be disbursed in 2011 and 2012. The contribution was new and additional to existing ODA, and for this reason a separate item was included on environment and climate change matters in international development cooperation in the State budget as of 2012. The new budget item shows the importance of environment and climate change matters within Iceland's official development assistance where allocations to climate change projects have earmarked funding instead of being a part of a general budget line.

Iceland's Fast Start Finance was appropriately balanced between adaptation, mitigation and capacity building activities, and gave special attention to women's empowerment in the field of climate change and increasing access to renewable energy sources. The funding was grant based, sourced from the broader aid budget and delivered through multilateral and bilateral channels. Focus was given to Iceland's bilateral partner countries, Malawi, Mozambique and Uganda, which are all among the Least Developed Countries.

One of the priority areas in Iceland's strategy for international development cooperation is environmental sustainability which has been identified as a cross-cutting theme. As part of this priority area, climate change related development efforts will play an increasingly important role. Accordingly, as shown in table 7-2 in the annex, 37% of Iceland's total ODA in 2012 or 9.7 million US dollars had mitigation or adaptation to climate change as a significant or primary objective. Thereof 4.6 million US dollars were allocated to projects

[6] There is no internationally agreed definition of what constitutes 'new and additional resources' under Article 4.3 of the UN Framework Convention on Climate Change. Therefore in determining 'new and additional' financial resources, Iceland both looks at the increasing ODA volumes, as well as the growing share of climate related ODA of total ODA.

with adaptation objectives only, 0.7 million for mitigation objectives only and 4.4 million for projects with both mitigation and adaptation to climate change as a significant or primary objective. This amounts to a 34% increase in climate related aid from 2011, where 7.3 million US dollars were allocated to projects targeting mitigation or adaptation (see table 7-1), or 28% of total ODA[7].

It should be noted that Iceland is not a member of the Global Environment Facility (GEF) and has therefore not made any financial contributions to the organization. Iceland will nevertheless continue to support adaptation and mitigation efforts in developing countries after the Fast Start Finance period, and in 2013 allocations to climate change related development efforts from the separate budget item, mentioned previously, increased by 34%. That excludes funding to several climate change related projects, such as a large project on geothermal exploration and development in East Africa.

7.3 Assistance to developing country Parties that are particularly vulnerable to climate change

Poor people in developing countries are more dependent on the environment and natural resources than people living in industrialised countries. The poor are often more exposed to the deterioration of natural resources, in particular water resources, environmental degradation, climate change and natural disasters. Iceland focuses on providing assistance to countries and regions where poverty and needs are the greatest. The choice of Afghanistan, Malawi, Mozambique, Uganda and Palestine as priority countries reflects this emphasis as they are all, except Palestine, among the LDCs[8].

Sustainable use of natural resources is a key element in Iceland’s development efforts, where developing countries benefit from Icelandic expertise and experience in the fields of renewable energy and sustainable fisheries.

The development and adaptation of fisheries management systems based on recommendations from scientific research are instrumental to climate change adaptation in developing countries. In Mozambique, Iceland cooperates with Norwegian and Mozambican authorities on a programme-based support to the Ministry of Fisheries in Mozambique, with an emphasis on reducing poverty and increasing food security in Mozambique’s fishing communities.

With regards to assistance through multilateral channels, the UNU Fisheries Training Programme is a key partner in capacity building and global education. Iceland has furthermore supported the PROFISH programme of the World Bank from its inception, with the purpose of strengthening sustainable fisheries management, promote economic growth, ensure health fish stock and enhance their yield. Iceland moreover participates in the Global Partnership for Oceans, launched by the World Bank during the UN Conference on

[7] Figures relate to projects and programmes marked with the DAC Rio markers, indicating that a major element of the activity is targeting the objectives of the Rio Conventions. The activities marked with the Rio markers are assessed to be assistance to the implementation of the Climate Convention, directly and/or indirectly.
[8] Namibia and Nicaragua were partner countries until 2011 and 2012 respectively.

Sustainable Development in Rio de Janeiro in 2012, which aims to promote the protection of the oceans and the sustainable use of marine resources, with particular focus on developing countries. Iceland will continue to play an active role in this field through the active work of the UNU Fisheries Training Programme, international organisations as well as bilateral projects implemented by ICEIDA.

It is important to support developing countries meet their energy demands through the use of clean and renewable energy sources and thereby reduce the impact of increased energy production on the release of greenhouse gas emissions. Between 2006 and 2012 Iceland implemented a project with the overall objective of enhancing the utilisation of geothermal resources in Nicaragua by strengthening capacities of government institutions.

The UNU Geothermal Training Programme is an important part of Iceland's multilateral support in this field. Created in 1979, UNU-GTP has assisted developing countries with significant geothermal potential to build capacity in geothermal exploration and development by offering specialised post-graduate education and training to experts from developing countries. Iceland has also been supporting the International Renewable Energy Agency (IRENA) as well as ESMAP, a renewable energy program within the World Bank. The program's mission is to assist low- and middle-income countries to increase know-how and institutional capacity to achieve environmentally sustainable energy solutions for low carbon development, poverty reduction and economic growth. As a part of this cooperation with the World Bank, a geothermal specialist was seconded by Iceland to work for ESMAP on analysis and design of World Bank projects in developing countries. In this context it has also been invaluable to be able to call on the large network of local geothermal specialists, whom have received training from the UNU Geothermal Training Programme in Iceland.

Iceland and the World Bank have furthermore made an agreement to collaborate on advancing geothermal energy utilisation in East Africa, more specifically the 13 countries of the East-African Rift Valley. The cooperation is part of the World Bank's response to the UN's Sustainable Energy for All Initiative. The partnership between Iceland and the World Bank is the largest initiative so far for promoting the utilisation of geothermal energy in developing countries, and Iceland has effectively become one of the Bank's key partners in this field. Iceland's participation in this area will be further strengthened, both in bilateral and multilateral cooperation.

Another area important to Iceland is the promotion of sustainable land management. Land degradation and desertification rank among the world´s greatest environmental challenges, greatly affecting a range of issues such as climate, biodiversity, soil quality, food and water security, peace and human well-being, especially for the more vulnerable rural poor. By supporting the UNU Land restoration Training Programme, Iceland attempts to fight land degradation by strengthening institutional capacity and training of development country experts.

The effects of climate change will most likely affect women more severely than men. Gender issues are therefore central in all discussion about climate change, both in mitigating and adapting to climate change. This applies especially to developing countries where the main livelihood is self-subsistence agriculture.

Iceland has actively promoted the important role of gender in the international climate negotiations, as well as supported several climate projects with the emphasis on women empowerment and gender equality, e.g. through organizations such as UN Women, WEDO and FAO. The aim is furthermore to mainstream gender in all climate related activities and in 2012, 59% of climate specific projects took gender perspectives into consideration.

One of the more notable efforts within this area is a project promoting gender responsive climate change mitigation and adaptation in Uganda. The project included research on gender and climate change in rural Uganda by Makerere University, preparations of the Ugandan delegation for the COP meetings, conferences and the development of a short training course on how to mainstream gender into climate change actions. The training course was developed by the UNU Gender Equality and Studies Program in close collaboration with Ugandan partners, and training and capacity building was provided for a selected number of experts and policy makers at the district level.

7.4 Provision of financial resources, including financial resources under Article 11 of the Kyoto Protocol

There are three main priority areas for financial flows in Iceland’s strategy for international development cooperation: Natural resources, including renewable energy and fisheries, human capital, including education and health, and peace-building, including good governance and post-conflict reconstruction. Environmental sustainability is one of two cross cutting priority issues in Icelandic development cooperation policy. Climate change related ODA financial flows fall mostly under natural resources including the UNU Geothermal and Fisheries Training Programmes and environmental sustainability, such as the UNU Land Restoration Training Programme and projects supported by Iceland’s Fast Start Finance commitments. Other important climate related activities under the natural resources priority area include support to ICEIDA’s geothermal energy projects in Nicaragua and in East Africa.

Tables 7-1 and 7-2 in the annex provide summary information on the distribution of resources in Icelandic development efforts.

7.4.1 Bilateral financial contributions[9]

[9] No clear definition exists in the UNFCCC reporting guidelines on what constitutes as bilateral and multilateral assistance respectively. For the purpose of this report bilateral contributions will be defined as support provided by Iceland‘s bilateral agency, ICEIDA, and multilateral contributions will be defined as support to multilateral organizations and international NGOs. This method is therefore not consistent with the DAC reporting methodology.

Most emphasis is put on the Least Developed Countries in Iceland's international development cooperation strategy. In terms of priority regions, high emphasis is placed on Sub-Saharan Africa, and specifically Malawi, Mozambique and Uganda where ICEIDA operates. As mentioned earlier, Iceland began the process of implementing the OECD DAC statistical reporting methods in 2012, and therefore reliable data on Iceland's development aid, consistent with the DAC guidelines, is only available as of 2011.

Table 5.1. Bilateral and regional financial contributions related to the implementation of the Convention 2011

Recipients Country/Region	Energy	Forestry	Agriculture	Industry	Other	Capacity building	Coastal zone man.	Other
Malawi						220.138		
Mozambique						62.250		
Namibia						500.804		
Nicaragua	684.974							
Uganda					13.747[10]	13.747		
Other	72.469					72.195		
Total	**757.443**				**13.747**	**869.134**		

As shown in table 5.1, Iceland's bilateral climate related development activities in 2011 were balanced between projects targeting mitigation and adaptation. The geothermal energy project in Nicaragua makes up the largest share of Iceland's mitigation efforts, and in terms of adaptation there is a clear emphasis on capacity building in Sub-Saharan Africa.

Table 5.2. Bilateral and regional financial contributions related to the implementation of the Convention 2012

Recipients Country/Region	Energy	Forestry	Agriculture	Industry	Other	Capacity building	Coastal zone man.	Other
Malawi						544.964		
Mozambique						1.639.907		
Nicaragua	555.577							
Uganda						113.010		
Other	188.583							
Total	**744.160**					**2.297.881**		

[10] Cross-cutting project in Uganda, divided equally between adaptation and mitigation.

In 2012, there was a 1.4 million USD increase in climate specific bilateral contributions, as seen in table 5.2. Regional distribution of bilateral contributions was similar to 2011, with a notable increase in contributions to adaptation, and cross-cutting activities.

Tables 7 b)-1 and 7 b)-2 in the annex provide further information, consistent with the guidelines on biennial reporting, on Iceland's bilateral and regional financial contributions.

7.4.1 Multilateral financial contributions

Iceland's international development cooperation policy places great emphasis on active participation in the work of international organisations. With clearer prioritisation set out in the Strategy for Iceland's International Development it was decided to place special focus on the work of four international organisations: the World Bank, UNICEF, UN Women and the United Nations University. Contributions to these organisations have amounted to approximately 55% of ODA to international organisations in recent years, and amounted to 62% in 2011 and 67,3% in 2012[11]. The current aim is to increase this proportion to 75%.

The Icelandic government will adhere to its commitments of providing assistance to developing countries to enable them to mitigate and adapt to the impacts of growing global warming and to reduce emissions. In terms of multilateral efforts the focus is on contributions to funds and projects that provide support to climate change adaptation and mitigation in the poorest developing countries, gender mainstreaming, capacity building through the Iceland based UNU programmes, in addition to active participation in the work of international organisations on renewable energy and fisheries. It is particularly worth mentioning the increased focus on energy and fisheries by the World Bank where Iceland supports projects such as PROFISH, the Global Partnership for Oceans (GPO) and ESMAP

Tables 7 a)-1 and 7 a)-2 in the annex provide detailed information on Iceland's financial contributions to climate related development activities through multilateral channels.

7.5 Activities related to transfer of technology, including information under Article 10 of the Kyoto Protocol

Iceland's support to technology transfer in relations to the implementation of the Climate Convention includes a broad spectrum of activities. These activities comprise transfer of both hard and soft technologies. The extent of this technology transfer is significant and cannot be clearly separated from other activities in Iceland's international development cooperation, including financial flows. In fact many development projects funded by Iceland include technology transfer and capacity building components. Since they form an integral part of a project, it is not possible to account for them separately.

[11] A proportion of Iceland's core contributions to multilateral organizations may be allocated to climate change activities, the amount of which cannot be assessed reliably. Therefore total core contributions have been included in Tables 7 a)-1 and 7 a)-2 in the annex

In terms of Iceland's measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally-sound technologies, there is a particular focus on renewable energy. The sustainable utilisation of natural resources is a priority area in Iceland's development cooperation, where Icelandic technical expertise, extensive knowledge and experience of utilisation of geothermal energy contributes to the MDG on sustainable development. The UNU Geothermal Training Programme has for many years played an important role in that regard.

Iceland is helping build capacity in developing countries to mitigate and manage the impacts of climate change. Iceland has committed resources that are creating enabling environments for private sector investment, strengthening national and regional institutional and regulatory frameworks, and assisting developing countries to take practical actions to cut emissions. Through the UNU training programmes, Iceland has helped enhance the capacity of participating countries to adapt to and mitigate climate change through training of officials in the fields of geothermal energy, fisheries and sustainable land management sectors, as well as in gender equality.

It should be noted that financial resources and transfer of technology for the purposes of adaptation to and mitigation of climate change have in recent years not been channelled through the private sector. Activities reported are therefore all undertaken by the public sector. However with the new geothermal development initiative in East Africa, implemented from 2013 onwards by ICEIDA, cooperation with the private sector will increase.

Table 6 – Description of selected projects or programmes that promoted practicable steps to facilitate and /or finance the transfer of, or access to, environmentally-sound technologies

<table>
<tr><td colspan="4">Project/programme title: Geothermal Capacity Building Project Nicaragua (GCBP)</td></tr>
<tr><td colspan="4">Purpose: The aim of ICEIDA through the GCBP was to assist Nicaragua to enhance its use of environmentally benign geothermal energy resources for power production in line with the energy policy of Government of Nicaragua.</td></tr>
<tr><td>Recipient country</td><td>Sector</td><td>Total funding</td><td>Years in operation</td></tr>
<tr><td>Nicaragua</td><td>Geothermal energy</td><td>US$ 3,583 million</td><td>2008-2012</td></tr>
<tr><td colspan="4">Description: The project's main components were:
1) To strengthen the capacity for technical and scientific supervision by the Ministry of Energy and Mines (MEM) and the Ministry of the Environment and Natural Resources (MARENA) to coordinate, supervise and monitor the development of geothermal resources in Nicaragua.
2) Develop a process for building capacity to follow-up, monitor, supervise and manage the development of geothermal projects in Nicaragua including environmental oversight. The development process was geared towards civil servants.
3) Endow the geochemical laboratory at MEM with technical resources, infrastructure and Equipment.</td></tr>
<tr><td colspan="4">Indicate factors which led to the project's success:</td></tr>
<tr><td colspan="4">Technology transferred: Building up know-how within the public sector on how to develop geothermal resources within Nicaragua.</td></tr>
</table>

Annex: Statistical information consistent with biennial reporting guidelines

Table 7-1

Provision of public financial support: summary information in 2011[12]

Allocation channels	*Year*									
	Icelandic króna - ISK					*USD[b]*				
	Core/ general[c]	*Climate-specific[d]*				*Core/ general[c]*	*Climate-specific[d]*			
		Mitigation	*Adaptation*	*Cross-cutting[e]*	*Other[f]*		*Mitigation*	*Adaptation*	*Cross-cutting[e]*	*Other[f]*
Total contributions through multilateral channels:	580.340.294	0	240.928.537	411.640.565		5.000.433		2.075.932	3.546.852	
Multilateral climate change funds[g]			16.412.789					141.419		
Other multilateral climate change funds[h]										
Multilateral financial institutions, including regional development banks	234.100.000			43.991.551		2.017.095			379.048	
Other	11.969.219			118.789.500		103.131			1.023.536	
Specialized United Nations bodies	31.741.453					273.496				
Other UN	302.529.622		224.515.748	248.859.514		2.606.711		1.934.513	2.144.269	
Total contributions through bilateral, regional and other channels		79.496.712	90.895.698	19.980.330			684.974	783.192	172.158	
Total	580.340.294	79.496.712	331.824.235	431.620.895		5.000.433	684.974	2.859.124	3.719.010	

[12] DAC Exchange rate used: 1 USD = 116.058 ISK

Table 7-2

Provision of public financial support: summary information in 2012[13]

Allocation channels	*Year*									
	Icelandic króna - ISK					*USD[b]*				
	Core/ general[c]	*Climate-specific[d]*				*Core/ general[c]*	*Climate-specific[d]*			
		Mitigation	*Adaptation*	*Cross-cutting[e]*	*Other[f]*		*Mitigation*	*Adaptation*	*Cross-cutting[e]*	*Other[f]*
Total contributions through multilateral channels:	550.225.596		300.614.938	534.130.202		4.397.653		2.402.651	4.269.012	
Multilateral climate change funds[g]			19.460.850					155.540		
Other multilateral climate change funds[h]										
Multilateral financial institutions, including regional development banks	204.020.000			100.946.030		1.630.621			806.807	
Other	38.146.545			124.747.464		304.885			997.039	
Specialized United Nations bodies	34.023.038					271.928				
Other UN	274.036.013		281.154.088	308.436.708		2.190.221		2.247.111	2.465.167	
Total contributions through bilateral, regional and other channels		93.107.856	273.366.636	14.139.585			744.160	2.184.871	113.010	
Total	550.225.596	93.107.856	573.981.574	548.269.787		4.397.653	744.160	4.587.522	4.382.022	

[13] DAC Exchange rate used: 1 USD = 125.118 ISK

Table 7 (a)-1

Provision of public financial support: contribution through multilateral channels in 2011

Donor funding	*Total amount*				*Status*[b]	*Funding source*[f]	*Financial instrument*[f]	*Type of support*[f, g]	*Sector*[c]
	Core/general[d]		*Climate-specific*[e]						
	Icelandic króna - ISK	*USD*	*Icelandic króna - ISK*	*USD*					
Total contributions through multilateral channels	580.340.294	5.000.433	652.569.102	5.622.784					
Multilateral climate change funds [g]	0	0	16.412.789	141.419					
1. Global Environment Facility									
2. Least Developed Countries Fund			16.412.789	141.419	Provided	ODA	Grant	Adaptation	Cross-cutting
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
Multilateral financial institutions, including regional development banks	234.100.000	2.017.095	43.991.551	379.048					
1. World Bank	234.100.000	2.017.095	43.991.551	379.048	Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. International Finance Corporation									
3. African Development Bank									
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other	11.969.219	103.131	118.789.500	1.023.536					
Nordic Development Fund			64.000.000	551.448	Provided	ODA	Grant	Cross-cutting	Cross-cutting
NGOs	11.969.219	103.131	54.789.500	472.087	Provided	ODA	Grant	Cross-cutting	Cross-cutting
Specialized United Nations bodies	31.741.453	273.496							
1. United Nations Development Programme	22.101.489	190.435			Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. United Nations Environment Programme	9.639.964	83.062			Provided	ODA	Grant	Cross-cutting	Cross-cutting

3. Other	302.529.622	2.606.711	473.375.262	4.078.782					
United Nations	18.900.000	162.850	5.362.000	46.201	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNU Geothermal Training Programme			187.856.039	1.618.639	Provided	ODA	Grant	Cross-cutting	Energy
UNU Fisheries Training Programme			157.300.000	1.355.357	Provided	ODA	Grant	Adaptation	Agriculture
UNU Land Restoration Training Programme			50.000.000	430.819	Provided	ODA	Grant	Adaptation	Forestry
UNU Gender Equality Training Programme			38.512.975	331.842	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UN Women	58.542.650	504.426			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNICEF	76.871.500	662.354			Provided	ODA	Grant	Cross-cutting	Cross-cutting
FAO	21.934.900	188.999	17.128.500	147.586	Provided	ODA	Grant	Cross-cutting	Agriculture
IFAD	2.904.250	25.024			Provided	ODA	Grant	Cross-cutting	Agriculture
WFP			5.704.999	49.156	Provided	ODA	Grant	Adaptation	Cross-cutting
UNHCR	5.501.500	47.403	11.510.749	99.181	Provided	ODA	Grant	Adaptation	Cross-cutting
IAEA	10.713.476	92.311			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNRWA	24.587.200	211.853			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WHO	11.932.000	102.811			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNFPA	20.296.100	174.879			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNESCO	22.277.160	191.949			Provided	ODA	Grant	Cross-cutting	Cross-cutting
ILO	13.440.000	115.804			Provided	ODA	Grant	Cross-cutting	Cross-cutting
OCHA	11.201.500	96.516			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WMO	3.427.386	29.532			Provided	ODA	Grant	Cross-cutting	Cross-cutting

Table 7 (a)-2

Provision of public financial support: contribution through multilateral channels in 2012

Donor funding	*Total amount*				*Status*[b]	*Funding source*[f]	*Financial instrument*[f]	*Type of support*[f, g]	*Sector*[c]
	Core/general[d]		*Climate-specific*[e]						
	Icelandic króna - ISK	*USD*	*Icelandic króna - ISK*	*USD*					
Total contributions through multilateral channels	550.225.596	4.397.653	834.745.140	6.671.663					
Multilateral climate change funds [g]	0	0	19.460.850	155.540					
1. Global Environment Facility									
2. Least Developed Countries Fund			19.460.850	155.540	Provided	ODA	Grant	Adaptation	Cross-cutting
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
Multilateral financial institutions, including regional development banks	204.020.000	1.630.621	100.946.030	806.807					
1. World Bank	204.020.000	1.630.621	100.946.030	806.807	Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. International Finance Corporation									
3. African Development Bank									
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other	38.146.545	304.885	124.747.464	997.039					
Nordic Development Fund			41.587.950	332.390	Provided	ODA	Grant	Cross-cutting	Cross-cutting
IRENA			38.711.700	309.402	Provided	ODA	Grant	Cross-cutting	Energy
NGOs	14.214.591	113.609	43.782.800	349.932	Provided	ODA	Grant	Cross-cutting	Cross-cutting
Other multilateral	23.931.954	191.275	665.014	5.315	Provided	ODA	Grant	Cross-cutting	Cross-cutting
Specialized United Nations bodies	34.023.038	271.928	0	0					

1. United Nations Development Programme	24.184.292	193.292			Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. United Nations Environment Programme	9.838.746	78.636			Provided	ODA	Grant	Cross-cutting	Cross-cutting
3. Other	274.036.013	2.190.221	589.590.796	4.712.278					
United Nations	19.128.623	152.885	2.302.998	18.407	Provided	ODA	Grant	Adaptation	Cross-cutting
UNU Geothermal Training Programme			243.158.671	1.943.435	Provided	ODA	Grant	Cross-cutting	Energy
UNU Fisheries Training Programme			155.400.000	1.242.028	Provided	ODA	Grant	Adaptation	Agriculture
UNU Land Restoration Training Programme			69.600.000	556.275	Provided	ODA	Grant	Adaptation	Forestry
UNU Gender Equality Training Programme			45.151.050	360.868	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UN Women	76.216.650	609.158	18.840.000	150.578	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNICEF	69.751.500	557.486			Provided	ODA	Grant	Cross-cutting	Cross-cutting
FAO	13.503.007	107.922	1.286.987	10.286	Provided	ODA	Grant	Cross-cutting	Agriculture
IFAD	3.142.000	25.112			Provided	ODA	Grant	Cross-cutting	Agriculture
WFP			23.905.264	191.062	Provided	ODA	Grant	Adaptation	Cross-cutting
UNHCR					Provided	ODA	Grant	Cross-cutting	Cross-cutting
IAEA	12.526.668	100.119			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNRWA	11.401.500	91.126			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WHO	11.400.000	91.114			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNFPA	9.001.500	71.944			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNESCO	11.154.105	89.149			Provided	ODA	Grant	Cross-cutting	Cross-cutting
ILO	13.440.000	107.419			Provided	ODA	Grant	Cross-cutting	Cross-cutting
OCHA	10.227.600	81.744	29.945.826	239.341	Provided	ODA	Grant	Adaptation	Cross-cutting
UNFCCC	9.542.431	76.267			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WMO	3.600.429	28.776			Provided	ODA	Grant	Cross-cutting	Cross-cutting

Table 7 (b)-1

Provision of public financial support: contribution through bilateral, regional and other channels in 2011

Recipient country/ region/project/programme[b]	*Total amount*		*Status*[c]	*Funding source*[g]	*Financial instrument*[g]	*Type of support*[g, h]	*Sector*[d]	*Additional information*[e]
	Climate-specific[f]							
	Icelandic króna - ISK	*USD*						
Total contributions through bilateral, regional and other channels	190.372.740,00	1.640.324,15						
Malawi	25.548.776	220.138	Provided	ODA	Grant	Adaptation	Water and sanitation	
Mozambique	7.224.611	62.250	Provided	ODA	Grant	Adaptation	Agriculture	
Namibia	58.122.311	500.804	Provided	ODA	Grant	Adaptation	Cross-cutting	
Nicaragua	79.496.712	684.974	Provided	ODA	Grant	Mitigation	Energy	
Uganda	3.190.865	27.494	Provided	ODA	Grant	Cross-cutting	Cross-cutting	
Other	16.789.465	144.664	Provided	ODA	Grant	Cross-cutting	Cross-cutting	

Table 7 b)-2

Provision of public financial support: contribution through bilateral, regional and other channels in 2012

Recipient country/ region/project/programme[b]	*Total amount*		*Status*[c]	*Funding source*[g]	*Financial instrument*[g]	*Type of support*[g, h]	*Sector*[d]	*Additional information*[e]
	Climate-specific[f]							
	Icelandic króna - ISK	*USD*						
Total contributions through bilateral, regional and other channels	380.614.077	3.042.041						
Malawi	68.184.789	544.964	Provided	ODA	Grant	Adaptation	Water and Sanitation	
Mozambique	205.181.847	1.639.907	Provided	ODA	Grant	Adaptation	Agriculture	
Nicaragua	69.512.724	555.577	Provided	ODA	Grant	Mitigation	Energy	
Uganda	14.139.585	113.010	Provided	ODA	Grant	Cross-cutting	Cross-cutting	
Other	23.595.132	188.583	Provided	ODA	Grant	Mitigation	Energy	

8 Research and systematic observation

8.1 Climatic Research

Most of the climate-related research in Iceland is focused on climate processes and climate system studies and impacts of climate change. Other efforts involve modeling and prediction, and large ongoing projects deal with mitigation measures, but there has been less research on socio-economic analysis.

8.1.1 Climate process and climate system studies

The Icelandic Meteorological Office (IMO) is a governmental institute responsible for producing regular and specific weather forecasts. It conducts monitoring and scientific studies of geohazards and hazard zoning in Iceland. It is involved with several kinds of research within the fields of meteorology, hydrology and geosciences and has a leading role in climate change studies in Iceland both in research and in its role as an advising body to the government. It conducts glaciological measurements and modeling with a special focus on glacio-hydrology.

Although IMO research and evaluation of climate change is mainly centered on the climate of Iceland, the IMO has also been active in many inter-national climate research projects. Studies of the spatial characteristics and long term changes in timeseries of temperature, precipitation, sea level pressure, river runoff and glacier changes have been conducted by IMO staff and published in international peer-reviewed journals.

Icelandic scientists have for many years contributed considerably to paleoclimatological work with their participation in many ice and sediment core projects. Most of this work has taken place within the University of Iceland. Some examples of research topics within that field and in related fields at the University include:

- A review of the size of Icelandic glaciers for the last 300 years and an estimate of their contribution to higher sea levels
- Analysis of seafloor sediment cores from the coastal shelf north of Iceland to reconstruct changes in sedimentation, biota and ocean currents
- Analysis of Tertiary and Quaternary oceanic paleo-fauna in order to chart changes in the system of ocean currents in that period
- Reconstruction of climate change around the North Atlantic in the last 13,000 years by

analysis of sedimentation (carbon content, pollen etc.) in lakes and fjords

8.1.2 Modeling and prediction

The IMO has taken part in research projects where downscaling is used to generate projections of future climate change. In these studies a numerical weather forecast model or a regional climate model is used to refine for a limited area the projected climate changes from a global climate model. Results from such studies have been used to drive models of glacier retreat, changes in river runoff. The results of this work have been published in reports and peer reviewed articles.

8.1.3 Impacts of climate change

The IMO has led a series of Nordic-Baltic climate impact projects focusing on three main renewable energy resources; hydropower, bio-fuels and wind power. The current one, the Climate and Energy Systems (CES) project follows suit from the earlier Climate and Energy (CE) and the Climate, Water and Energy (CWE) project. These projects were funded by Nordic Energy Research. In these studies projects the objective was to make comprehensive assessment of the impact of climate change on Nordic renewable energy resources including hydropower, wind power, biofuels and solar energy. This included assessment of power production and its sensitivity and vulnerability to climate change on both temporal and spatial scales; assessment of the impacts of extremes including floods, droughts, storms, seasonal pattern and variability. The CE project finished with the release of the book "Impacts of Climate Change on Renewable Energy Resources - Their role in the Nordic Energy System" which was published by the Nordic Council of Ministers in 2007. The ensuing CES project had the goal of looking at climate impacts closer in time and assessing the development of the Nordic electricity system for the next 20-30 years. The project started in 2007 and finished in 2011 with the release of the book "Climate Change and Energy Systems. - Impacts, Risks and Adaptation in the Nordic and Baltic countries".

Following the CES project, two projects on the cryosphere and wind were initiated by some of the participants in the previous climate and energy related projects. These were the SVALI and ICEWIND projects, both funded by the Top Research Initiative (TRI). The SVALI project examines the complex effects of climate change on the Arctic environment, especially as glaciers, ice and snow. The projects tackle questions such as how fast is land ice volume in the Arctic and North-Atlantic area changing, and why? Will these processes continue to accelerate? What are the consequences for sea-level and ocean circulation? What are the implications for society? The ICEWIND project focuses on wind energy in cold areas and its main goal is to share knowledge between the Nordic countries and identify factors that delay or prevent the adoption of wind energy in the Nordic countries. In Iceland the main focus has been on establishment of atlases for wind and icing as well as integration of wind power with other energy sources.

Various experimental and monitoring studies have reported on the impacts of climate change on Icelandic ecosystems, flora and fauna. Effects of elevated atmospheric CO2 concentration, temperature and fertility on productivity of forest trees was studied in a Nordic project during 1995-2000 in cooperation between the Agricultural University of Iceland (AUI) and Icelandic Forest Research (IFR). This effort also involved studies with experimental soil heating and measurements of in ecosystem fluxes. The impacts of elevated CO2 concentration alone on heathland vegetation has also been studied around natural CO2 springs in W-Iceland. Icelandic participants in the ITEX-project (International Tundra Experiment) have studied the effects of climate warming of 1-2 °C in two widespread but contrasting plant communities. They are from the University of Iceland (UI), AUI and the Icelandic Institute of Natural History (IINH). Both AUI and IFR took part in a Nordic Centre of Excellence during 2003-2008, where the effects of climate variability on ecosystem function of Icelandic wetlands, barren lands and forests were studied. A new European research project, FORHOT, was launched recently in cooperation between AUI, IFR, UI and others, which studies how natural gradients in soil temperature created after an earthquake in 2008 in S-Iceland are affecting ecosystem functioning of natural grasslands and planted forests. Another ongoing study which compares freshwater ecosystems with contrasting water temperatures at Mt. Hengill in S-Iceland is run in cooperation between Institute of Freshwater Fisheries (IFF), UI and international research groups.

Scientists at UI and other research institutes in Iceland and abroad have been conducting a number of paleoenvironmental studies, looking at glacial- and climatic fluctuations over different time scales, as well the vegetational and faunal history of Iceland. Study objects include glacial landforms and sediments, and fossil plant and invertebrate remains in soils, lake- and marine sediments.

Many other projects that have the purpose of monitoring the current state of environmental factors, flora and fauna in Iceland and Icelandic waters exist. Even if they are not always primarily intended to study impacts of climate change, they can often be used for that purpose. Such long-term national inventories are e.g. done by the Icelandic Meteorological Institute (IMI; e.g. climate and annual runoff), UI (e.g. glacier size), Marine Research Institute in cooperation with UI (fish stocks and oceanic environment), IINH (distribution of native flora and fauna), AUI (soil inventory, wetlands and the IGLUD land-use inventory), IFR (national forest inventory), the Soil Conservation Service of Iceland (SCS; inventory of ecosystem changes in eroded areas), and the Institute of Freshwater Fisheries (freshwater environment and fish stocks). Continuous remote sensing by satellites and aerial photographs may also yield important insights into how climate affects nature and societies. The primary local suppliers of such data are the National Land Survey of Iceland and various private companies. Besides the various national inventories there are also number of important large-scale research projects at various research institutes and universities. One of those is the SCANNET, a long-term catchment monitoring study in western Iceland. It is an EU-funded project, consisting of a net of research stations on drylands around the North Atlantic, intended to enhance and coordinate research on ecosystem change because of pollution and land-use change. Other such long term projects include e.g. long-term ecosystem research at Lake Mývatn and Lake Þingvallavatn.

8.1.4 Carbon cycle and carbon sequestration studies

The Agricultural University of Iceland (AUI), Icelandic Forest Research (IFR; the research branch of the Iceland Forest Service) and the Soil Conservation Service of Iceland (SCS) have conducted various studies focusing on the carbon cycle of both natural and managed ecosystems, both together and in cooperation with various national and international partners. Part of this research has been on sequestration and loss of CO_2 and other GHGs from soil and vegetation because of land-use change, including afforestation-deforestation, revegetation-devegetation and drainage-wetland restoration. The three institutes form together the sectoral expertise on land-use change in Iceland‘s GHG bookkeeping and together with the Environment Agency of Iceland (EAI) annually prepare a report on the national GHG dynamics to UNFCCC, where national changes in both GHG emissions and net-sequestration are estimated. The institutes have also been involved in a number of focused research projects on the effect of afforestation, revegetation, grazing control and wetland drainage on the GHG balance, both on the national and international level. Such studies on soil carbon started in the 1980s, when effects of grazing control and fertilization on C-concentrations of degraded highland soils were studied. This work also became a part of a Nordic Centre of Excellence (NECC; Nordic Centre for Studies of Ecosystem Exchange and its Interactions with the Climate System), and then multi-annual flux measurements of CO_2 and H_2O exchange were done. This and other works have showed that forests become net sinks for CO_2 soon after establishment and carbon accumulates in dryland forest soils, at least during the first 50 years following afforestation. A review article showing this has now (2014) been accepted in the journal Global Change Biology. Recent studies at AUI showed that traditional use of perennial hayfields did not lead to losses of soil organic carbon and hayfields created by annual fertilization on eroded sands in S-Iceland have accumulated large amounts of soil organic carbon, even if the aboveground biomass has been harvested annually. Recently, a large-scale study (CarbBirch), looked at on how revegetation and establishment of mountain birch woodlands on formerly eroded areas changes the ecosystem C stocks, soil chemistry and biodiversity. New ongoing research efforts by these partners involve projects on GHG-fluxes of undisturbed and drained wetlands, as well as changes after wetland restoration, effects of afforestation and revegetation on albedo changes, impact of aeolian dust transport on ecosystem function and CO_2 flux measurements over afforested drained wetland.

Restoration of drained wetlands has recently been added as a part of the Icelandic climate mitigation policy. A small program started some years ago aiming to reclaim drained wetlands, but large wetland areas in the lowlands in Iceland were drained with government support in the decades after WW II. The draining had almost come to a stop in 1990, but some of the drained wetlands are used for cultivation or grazing, while others have been abandoned by agriculture. Research on the carbon balance of Icelandic wetlands contributed to increase the government‘s emphasis on reclaiming wetlands, citing carbon sequestration benefits in addition to biological diversity concerns. The 2009 report on the technical and economic possibilities of mitigating GHG emissions in different sectors of the Icelandic economy pointed out three feasible ways of human induced C-sequestration (afforestation, revegetation and wetland restoration). It concluded that all are among less expensive mitigation options available for the Icelandic society to reduce its national net-emissions. The reduction potential of these land-use options was estimated to be 15% of the net national GHG-emissions in 2020 (from a business as usual scenario), if continued at similar rate as at present. If combined with other inexpensive methods that can even give a net benefit to the national economy, such as increased use of more efficient vehicles and increased walking and cycling, the net emissions could be reduced by 19% in 2020. If however the afforestation, revegetation and wetland restoration activities were to be increased from their current levels they alone could reduce the net emissions in 2020 by as much as one third.

The University of Iceland (UI), the National Centre for Scientific Research in Toulouse, France, the Icelandic Meteorological Office, and several international collaborators and the National Energy Authority (NEA), in cooperation with French researchers, have studied further the role of chemical weathering of rocks and river-suspended material in the global carbon cycle. The reaction of Ca derived from silicate weathering with CO2 in the world's oceans to form carbonate minerals is another critical step in long-term climate moderation. The Ca is delivered to the oceans primarily via rivers, where it is transported either as dissolved species or within suspended material. A field study to determine these fluxes has beenwas performed on several catchments in northeastern Iceland. The results indicate inter alia that chemical weathering in Iceland results in significant sequestration of carbon from the atmosphere. A recent PhD study at UI also reported a strong correlation between the riverine DOC transport at landscape and national scale and modelled terrestrial productivity from MODIS satellite data. In other publications from UI the total flux of dissolved inorganic carbon by chemical weathering has been estimated to be of similar magnitude as all anthropogenic emissions from Iceland. How much of this flux will be permanently stored in terrestrial and oceanic sinks is, however, difficult to estimate. Currently there is an ongoing study, ForStreams, which investigates e.g. how large proportion of the terrestrial C-sequestration in forests and revegetated areas leaves as dissolved carbon (DOC and IC). This is done by harvest measurements in relatively small catchments and monitoring their dissolved carbon flux in stream water.

The MRI is currently a partner in the EU-funded project Changes in Carbon Uptake and Emissions by Oceans in a Changing Climate (CarboChange), that aims at quantifying oceanic carbon (CO_2) uptake under changing climate conditions, thereby using past and present data to infer on our ocean's future.

Carbon sequestration by chemical weathering is a natural phenomenon, not directly affected by anthropogenic factors. Rattan Lal, a world famous soil scientist, published in 2009 a review where he linked Icelandic studies on chemical weathering and studies on sequestration in soils and vegetation by revegetation and afforestation. He concluded that if all those natural and anthropogenic CO2-sinks would be included in Iceland's GHG bookkeeping in the future, it could offset fossil fuel emission by 2025 and beyond, and make Iceland an emission-free country.

8.2 Systematic observation

The institutions most important for the observation of climate change are the Icelandic Meteorological Office (IMO) and the Marine Research Institute (MRI). Other institutions monitor changes in natural systems that are affected by climate change, notably the Icelandic Institute of Natural History (IINH), which monitors the state of flora and fauna in Iceland and the Science Institute of the University of Iceland which monitors changes in glaciers and land movements.

8.2.1 Atmospheric, hydrological, glacier and earth observing systems

The IMO is responsible for atmospheric climate monitoring and observation. The IMO monitors and archives data from close to 200 stations. These stations are either manual (synoptic, climatological and precipitation stations) or automatic. The number of synoptic stations in operation (about 40) was relatively constant from 1960 to 2000 but with increasing numbers of automatic stations the synoptic network has been scaled down to 33 stations. The observations are distributed internationally on the WMO GTS (Global Telecommunication System). The manual precipitation network has been steadily expanding and now consists of about 70 stations measuring precipitation daily in addition to the synoptic stations. The majority of the precipitation stations report daily to the IMO database. The automation of measurements started in Iceland in 1987, and the number of automatic stations has been rapidly growing since then. The IMO now operates about 70 stations and about 35 in addition to this in cooperation with the National Power Company, The Energy Authority and the Maritime Administration. A repository of data from the about 50 stations operated by the Public Roads Administration is also located at the IMO. A majority of automatic stations observe wind and temperature every 10 minutes, a few once per hour, and most transmit data to the central database every hour. Many stations also include humidity, pressure and precipitation observations, and a few observe additional parameters (shortwave radiation and ground temperatures) or observe at more than one level.

The IMO participates in the Global Atmospheric Observing Systems (GAOS). The IMO has participated in the MATCH ozone-sounding program during the winter months since 1990, and the data are reported to the International Ozone Data base at NILU, Norway. The three GAW stations are: the BAPM at Írafoss and Stórhöfði, where tropospheric ozone, carbon dioxide, methane and isotopes of oxygen and carbon are monitored in cooperation with NOAA. Heavy metals and Persistent Organic Pollutants (POPs) in air and precipitation are monitored and reported to AMAP and OSPAR. In Reykjavik, data on global radiation are collected and reported annually to the World Radiation Data Center in St. Petersburg (WRDC).

The IMO also monitors hydrological conditions in Iceland and runs a network of about 200 gauging stations in Icelandic Rivers. The network provides basic information for knowledge of the hydrology of Iceland. As the importance of monitoring and mediating information has been growing, the network has been updated and transmits data to the IMO centre at least once a day. The gauge network mainly measures water-flow, water-level and ground water, and in some cases other environmental factors.

Furthermore, the IMO runs flow monitoring network to watch, measure and warn against danger from floods originating in sub-glacial volcano and geothermal systems, or melt water, heavy rain and ice blockage of river-flow. The development of the network began in 1996, following jökulhlaup in Skeiðará, and has in the last decade been extended to the areas south and north of Vatnajökull, south of Mýrdalsjökull, the South Iceland lowland and to Borgarfjörður. Each monitoring station has electronic registration equipment, pressure sensor to measure the water level, sensors for the conductivity and temperature in the water, solar-panel which provides energy for the station, a telephone and a modem for the transfer of data. When conductivity or the water level reaches a given limit the IMO and the Icelandic Emergency Watch are alerted and a decision on actions can be taken.

The glaciers in Iceland have changed immensely in historic time, in particular in most recent decades, as the decrease amounts to approximately 0,3-0,5% every year. In an expedition twice a year, spring and autumn, scientists of the IMO keep track of the development of Hofsjökull and Drangajökull, measuring precipitation, ablation and ice-slide.

Another glacier measuring project was launched by the IMO jointly with the Institute of Earth

Science of the University of Iceland, in 2008, aiming at the high-resolution mapping of the surface of the largest glaciers using laser technology from airplane. The project is endorsed by the Icelandic Polar Year Commission. It set out in September 2008, comprising Hofsjökull, Mýrdalsjökull, Eyjafjallajökull, Eiríksjökull and Snæfellsjökull.

The outlines of Icelandic glaciers have been registered, using maps, aerial photographs and satellite images. The data has been released, e.g. by World Glacier Monitoring Service in Zürich and Global Land Ice Measurements from Space (GLIMS) in Flagstaff, Arizona.

The Icelandic Meteorological Office operates a network of continuous geodetic GPS stations in Iceland to monitor crustal deformation related to plate movements, volcanic unrest and earthquakes. With geodetic quality instruments and specialized software it is possible to achieve the daily position of the stations to within a few millimeters. CGPS stations are therefor an excellent tool to monitor crustal deformation. These stations allow IMO staff to monitor isostatic crustal changes that are occurring as a result of glacier thinning due to climate change.

8.3.2 Ocean climate observing systems

Both the IMO and the Marine Research Institute (MRI) contribute to ocean climate observations. The IMO and MRI have been supporting Meteo France in deploying surface drifters with barometers and SST for weather observations and climate in recent years. The Marine Research Institute (MRI) maintains a monitoring net of about 70 hydrobiological stations on 10 standard sections (transects) around Iceland. These stations are monitored three to four times per year for physical (temperature, salinity) observations and once to two times a year (phosphate, nitrate, silicate) for chemical observations and once a year for biological observations (phytoplankton, zooplankton). Some of these stations have been monitored regularly since around 1950. The MRI has monitored carbonate system parameters on two time series stations northeast and west of Iceland since 1983. A network of about 10 continuous sea surface temperature meters is maintained at coastal stations all around the country.

The MRI has been involved in several monitoring projects of ocean currents, in cooperation with European and American scientists. This work has included projects such as the Meridional Overturning Exchange with the Nordic seas (MOEN), the Arctic-Subarctic Ocean Flux-array for European climate: West (ASOF-W), West-Nordic Ocean Climate, Thermohaline Overturning at Risk (THOR) and recently the North Atlantic Climate (NACLIM) project, which all involve the monitoring of fluxes over the Greenland – Scotland Ridge.

8.4 Research on Mitigation Options and Technology

8.4.1 The IDDP project

One notable research project on geothermal energy, which could have a potentially great impact on the exploitation of geothermal in Iceland and worldwide, is the Iceland Deep Drilling Project (IDDP). The main purpose of the IDDP project is to find out if it is economically feasible to extract energy and chemicals out of hydrothermal systems at supercritical conditions. An Icelandic energy consortium was established around the IDDP in the year 2000. A feasibility report was completed in May 2003. To begin with the consortium was composed of three Icelandic energy companies (HS Orka hf (HS), Landsvirkjun (LV), Reykjavik Energy (OR)) and the National Energy Authority of Iceland (OS). Alcoa Inc., the international aluminum company, joined the consortium as funding partner from 2007-2013, and Statoil ASA, the Norwegian oil company, joined in 2008-2011. LV drilled the first full scale deep IDDP-1 well in 2009 at Krafla, NE-Iceland, which the IDDP consortium intended to deepen to 4.5 km to reach 400-600°C hot supercritical hydrous fluid. However, the drilling operation of IDDP-1 was abruptly terminated by late June at 2104 m depth when drilling penetrated molten rock (magma) over 900°C hot.

Jointly LV and IDDP decided to complete the well with a cemented sacrificial casing to 1950 m depth, inside a production casing to the same depth, in order to attempt a production test from the >500°C contact zone of the magma intrusion. A slotted liner reached from 1950 m to 2072 m depth. The IDDP-1 well was then flow tested for two years, from 2010-2012, and proved to become the world hottest geothermal production well with a wellhead temperature of more than 450°C, flowing dry superheated steam at very high pressures (40–140 bar) and high enthalpy (close to 3200 kJ/kg). Production tests indicated the IDDP-1 well was capable of producing up to 36 MWe depending on design of turbine system. Series of pilot tests for power production were undertaken during and after the flow test – yielding breakthrough results in dealing with a magma within a geothermal system. First of all, (i) the IDDP project managed to drill into molten rock >900°C hot and get out of it; (ii) produce high permeability by hydrofracking the contact aureole rocks with cold drilling fluid; (iii) manage to insert a protective casing (sacrificial casing) and a liner; (iv) produce superheated dry steam from the contact aureole at world record temperature; (v) show that hostile fluid chemistry could safely be dealt with by steam treatment; (vi) enabling the steam to be taken directly into conventional steam turbines and finally, (vii) proof that world's first Magma-EGS system had been created, confirmed by an injection tracer test after the flow tests. A Special Issue of Geothermics (volume 49, January 2014) is devoted to the Iceland Deep Drilling Project. The IDDP-1 well had to be abruptly cooled due to valve failure and the pilot studies and flow test terminated. Many technical hurdles were met during drilling and the subsequent flow test of the IDDP-1 well. The lessons learned are of very high value and the IDDP teams believe that proper engineering and geoscience carry the keys to a breakthrough in high enthalpy geothermal utilization worldwide.

Within the next few years, 2015-2020, HS Orka and Reykjavik Energy intend to drill 3-4 km deep IDDP wells within their geothermal fields in SW-Iceland, which IDDP consortium then intends to deepen to 5 km. In addition to the IDDP consortium, ICDP (International Continental Scientific Drilling Program) and the NSF (United States National Science Foundation) granted financial supports for core drilling within IDDP wells for scientific studies. Numerous research proposals from the international scientific community are active, ranging from petrology and petrophysics to fluid chemistry, water rock reactions, surface and borehole geophysics and reservoir modeling and engineering. The IDDP is a long term research and development project which will take at least ½ a decade more to conclude. In the long term, however, the potential benefits of the IDDP regarding increased use of climate-friendly geothermal energy include: (i) Increased power output per well, perhaps by an order of magnitude, and production of higher-value, high-pressure, high-temperature steam, (ii) Development of an environmentally benign high-enthalpy energy source below currently producing geothermal fields – and thereby diminishing environmental footprints of power production, (iii) Extended lifetime of the exploited geothermal reservoirs and power generation facilities, and (iv) Re-evaluation of the geothermal resource base worldwide.

8.4.2 The CarbFix project

An international team of experts working closely with Reykjavik Energy has been preparing the initial tests of one of the world's first carbon-dioxide mineral storage plant near the Hellisheiði geothermal power plant in Iceland. Gas mixture of CO_2 and H_2S will be pumped from the power plant deep into the basaltic rocks near the plant. Chemical reactions within this reactive volcanic rock type will turn the CO_2 into carbonate minerals. This project is a partnership of Reykjavik Energy; University of Iceland; Columbia University's Earth Institute; and the National Centre for Scientific Research in Toulouse, France. Several other universities and research companies have participated in the project.

8.4.3 Fuels

Electric vehicles, run by fuel cells were tested in the first years of the tenth decade of the twentieth century. The advent of more powerful battery cars has caused an interesting development of this sector. Much of the work of Icelandic New Energy Ltd. has been devoted to battery cars.

Carbon Recycling International (CRI) has been developing methods to produce green methanol from renewable hydrogen and CO_2 which is obtained from geothermal boreholes using their own catalysis technology. The company has built a plant at the Svartsengi geothermal site in Reykjanes south of Reykjavik to produce methanol to be mixed with conventional vehicle fuels.

The Innovation Center of Iceland is preparing an intesting new project involving sailing yachts in the tourism industry in Husavik Northern Iceland - the project involves the use of hybrid technology to harness energy for electricity production and storage in batteries - inside the yachts equipped with propellers to be used in the "braking" mode.

9 Education, training and public awareness

9.1 General policy toward education, training and public awareness

The educational system in Iceland is administered by the Ministry of Education, Science and Culture. The Ministry prepares educational policy, oversees its implementation, and is responsible for educational matters at all educational levels. Education has traditionally been organized within the public sector, and there are few private institutions in the school system. Almost all private schools receive public funding.

The National Curriculum Guide applies to all grades and subjects in compulsory schools and further specifies what is to be co-ordinated in all Icelandic compulsory schools. Based on the objective articles of the preschool, compulsory school and upper secondary school acts, six fundamental pillars of education have been defined for the competence that pupils should achieve at compulsory school. One of the six pillars is “Education towards sustainability”, which concerns the interplay of the environment, economy, society and welfare. Sustainability includes respect for the environment, sense of responsibility, health, democratic working methods and justice, not only at the present time but also for future generations.

Key policy documents of the government contain the priorities of the Icelandic government regarding sustainability and climate change; Welfare for the future (first published in 2002 and revised in 2007 and 2010), the Climate Change strategy (2007) and Climate Mitigation Action Plan (2010). Those policies contain sections and stipulations on actions regarding education, public participation, awareness raising, media and the role of civil society in general.

In 2012 the Icelandic Parliament agreed upon a resolution on the strengthening of the green economy in Iceland. The resolution builds upon a parliamentary report suggesting various measures for awareness raising and enhancing sustainable education, including a long-term agreement in support of the Eco-School project (see X.c) conducted by the environmental NGO Icelandic Environment Association (Landvernd) with the aim of making sustainability education an integral feature of all school curricula; to revise courses available at teacher training institutions in order to incorporate education towards sustainability into the general teacher training and retraining programmes; and to establish a special “Sustainability Education Fund” to provide grants for institutions and projects that support education towards sustainable development.

Individual local authorities have also taken steps toward increased sustainability, such as the small municipality Djúpavogur, which has joined the international Cittaslow movement (www.cittaslow.org) and the small municipality Snæfellsbær which became the first municipality in Iceland to earn the Earth Check silver certification.

9.2 Primary, secondary and higher education

A fundamental principle of the Icelandic education system is that everyone is to have equal access to education irrespective of sex, economic status, geographic location, religion, disability and cultural or social background. The educational system is divided into four levels. Pre-school is the first educational level and is intended for children below the compulsory age for education. Parents are free to decide whether their children attend preschool. Compulsory Level is the second educational level. Children and adolescents must by law attend 10 years of compulsory education (age 6 – 16). Upper Secondary Level is the third educational level which generally incorporates the age group 16 – 20. Everyone has the legal right to enter school at that school level, irrespective of their results at the end of compulsory schooling. Those that have the right to enrol in upper secondary school also have the right to study until the age of 18.

There are currently seven higher education institutions in Iceland that fall under the auspices of the Ministry of Education, Science and Culture: The University of Iceland and the University of Akureyri are public universities. The Agricultural University of Iceland and Holar University College are public universities formerly under the auspices of the Ministry of Agriculture. Reykjavik University, Bifröst University and Iceland Academy of the Arts are private institutions that receive state funding and operate under structural charters approved by the Ministry of Education, Science and Culture. At university level emphasis on education and research in the field of natural resources and environmental science is growing. Thus there are several programs available, such as a diploma and BS studies in natural resources sciences at the University of Akureyri; a master's program in Environment and Natural Resources studies at the University of Iceland; BS degrees in Natural Resources and Environmental Science at the Agricultural University of Iceland, in addition to a variety of courses on sustainability, climate change and environmental issues available in all of those institutions.

The Eco-Schools Programme is an international project (www.eco-schools.org) funded by the government and managed in Iceland by the NGO Landvernd (The Icelandic Environment Association). Eco-Schools is a program for environmental management and certification which aims at enhancing environmental education and to strengthen environmental policy in schools. It is designed to implement sustainable development education in schools by encouraging children and students to take an active role in how their school can be run for the benefit of the environment. Schools that fulfil the necessary criteria are awarded the Green Flag for their work, which they keep for two years.

Each Eco-School forms an environmental committee, and works towards an Eco-Code within the school. Schools can choose to work on up to ten themes and set two-year goals for one or two of them at a time. Landvernd assesses their work and recognizes those who meet the requirements with a Green Flag. The themes are: Climate change, water, energy, waste (garbage), native place (local community), transportation, public health (health and wellness), biodiversity, Local Agenda 21 and landscapes.

School participation in the program in Iceland has increased steadily since the work began in 2001. In 2013, 210 schools at all school levels participated in the program, reaching over 45% of all children at the pre-school level, 55% of all children at the compulsory (elementary) school level and 35% of all students at the upper secondary level and the number is steadily rising.

In 2008 the program‘s steering committee decided to open up the program to other schools, such as Sunday schools and summer schools, according to the international guidelines of the Eco-Schools Programme. The program is financially supported by the Ministry for the Environment and Natural Resources and the Ministry of Education, Science and Culture, as well as municipalities throughout the country.

Iceland runs four training programmes as a part of the UN University, three of which offer training that benefit the fight against climate change (see 7.3).

9.3 Public information campaigns

There are several public campaigns that have contributed to the reduction of emissions, whether they have been directly aimed at doing so or not. One of those is the annual “Bike to work” campaign, conducted by the National Olympic and Sports Association of Iceland with financial support from i.a. the public sector. The campaign – which over a period of two weeks encourages the public to leave their car at home and bike, walk or use public transport to work – has been widespread and successful, with good participation from the public. The same association conducts other campaigns aiming at encouraging people to use their own powers to transport – such as the “Lífshlaupið” campaign (where all kind of physical movement or sport do count), and the “Bike to School” and “Walk to School” campaigns directed towards students. The “Bike to School” campaign was established in Iceland as a part of the European Mobility Week (www.mobilityweek.eu), September 16 – 25, which most of the largest municipalities participate in, encouraging people to use environmental friendly methods for transportation. The “Walk to School” campaign is a part of the International Walk to School month (www.iwalktoschool.org).
The Eco-School project (see X.b) has proven to be a successful method, not only for increasing environmental awareness at schools but also in the homes of the children as they bring forward their knowledge on environmental issues and climate change to their parents and other family members. At the university level awareness raising projects are conducted, such as the annual “Green Week” at the University of Iceland organized by the students of the masters Environment and Natural resources program.

The Ministry for the Environment and Natural Resources manages some awareness raising projects. Annually the Day of the Environment (April 25th) and the Day of the Icelandic Nature (September 16th) are celebrated national wide, the former being concentrated on international environmental issues such as Climate Change and Sustainability. At celebration events on those days the Minister for the Environment and Natural Resources grants chosen individuals, media, school children or companies awards for their commitment for the environment and these awards tend to get the attention of the main stream media. Biannually the Ministry conducts a conference on environmental matters for the environmental sector and stakeholders, with sustainability as a theme every other conference.

9.4 Training programmes

Iceland runs four training programmes as a part of the UN University, of which three benefit directly the fight against climate change. Firstly, The Geothermal Training Programme (UNU-GTP) is a postgraduate training programme, aiming at assisting developing countries in capacity building within geothermal exploration and development in order to enhance their use of other energy sources than fossil fuel. The programme consists of six months annual training for practicing professionals from developing and transitional countries with significant geothermal potential.

Secondly, the objective of the Gender Equality Studies and Training Programme (GEST) is to promote gender equality and women's empowerment in developing countries and post-conflict societies through education and training. In cooperation with the Ministry for the Environment and Natural Resources in Iceland, Makerere University – School of Women and Gender Studies, Ministry of Water and Environment and Ministry of Gender, Labour and Social Development in Uganda, GEST in 2011 developed study material and a five day training course on gender and climate change. The overall objective of the course is to build knowledge and understanding of the causes of climate change and its impact on development and gender relations in Uganda, and thus building local capacity to design and implement gender-responsive climate change policies, strategies and programmes by using analytical and critical thinking skills. Three pilot courses were run in Uganda in years 2012 and 2013 and GUEST is now working on transferring this project to the Ugandan government in order to have the courses rolled out nationally in Uganda.

Thirdly, The United Nations University Land Restoration Training Programme (UNU-LRT) provides a postgraduate training for specialists from the developing countries in the broad field of restoration of degraded land and sustainable land management, and aims at assisting developing countries in capacity development within this field. The main concern of UNU-LRT is land degradation, soil erosion, unsustainable land use and desertification.

9.5 Resource or information centres

The Icelandic website of the Ministry for the Environment and Natural Resources, www.umhverfisraduneyti.is, contains extensive official information on climate change; from relevant acts and regulations and policies to the latest news on climate change, information on the United Nations Framework Convention on Climate Change and important external links.

Amongst those are links to the main institutions in the field of climate change, such as the Environment Agency of Iceland (EAI), which has various information regarding climate change on its official website for different target groups. There, general information on possible and probable effects is to be found, as well as information on the causes, types of greenhouse gases, the Kyoto protocol and the ETS. In 2013 the EAI added new pages on how individuals can make a difference in their daily lives (www.ust.is/einstaklingar/loftslagsbreytingar/hvad-get-eg-gert), e.g. by choosing transportation with lower carbon footprint. The latest NIR (inventory reports) are also available online. Among the most popular webpages of the EAI site is www.graenn.is (e. green.is) on how consumers can decrease their negative impact on the environment, including the climate. The EAI also highlights a few indicators on the state of the environment, where climate change is one of six main categories. The indicators are updated yearly and include i.a. yearly average heat and changes in Vatnajökull glacier. In addition, the EAI specialists are regular guests of national radio programs discussing various green tips.

Another important resource is www.vedur.is, the official website of the Icelandic Meteorological Office, which has a sub section on climate change containing extensive information on the background and science material on climate change. There the mechanisms behind climate change are explained in a simple language that should appeal to the general public; the content of the IPCC reports is made accessible, both in English and Icelandic as well as news and information on the climate change impact in Iceland.

The websites of the Soil Conservation Service of Iceland, www.land.is, and the Iceland Forest Service, www.skogur.is, provide information on climate-related challenges these institutions are engaged in.

Most of the institutions mentioned above, including the Ministry, have established and maintain Facebook pages to disseminate their information to the general public, i.a. news and information on climate change. This has proven to be an important information channel, taken into account the limited financial resources of those institutions, due to the fact that it is inexpensive, easily accessible and that over 70% of Icelanders have a registered Facebook account.

Other information sources worth mentioning are e.g. the website of the Energy Agency, www.orkusetur.is, where the public can access information and calculators for diverse private energy use, such as on household electricity and heating, transportation and carbon emissions. The National Centre for Educational Materials (NCEM) has in cooperation with the EAI facilitated an educational website called “My World“, featuring different environmental issues for school children aged 6 to 16. It includes information and interactive learning material on various environmental issues including climate change. Many schools use the website which includes instructions for teachers. The website is hosted and supervised by the NCEM but the

EAI offers information and expert assistance during updates. In addition, several privately run websites disseminate news and information on climate change, such as www.loftslag.is and www.tuttugututtugu.com.

Due to Iceland's small population, access to both national and local media is relatively open, leading to a higher proportion of information dissemination on environmental issues. Information officers working for the Ministry and its institutions have direct and personal contact to key players within the mass media which gives them unique opportunity to present information through the largest TV and radio channels as well as the main stream newspapers. The mass media frequently publish press releases and general news issued by those institutions and Ministry.

9.6 Involvement of the public and non-governmental organizations

The Ministry for the Environment and Natural Resources has for the past years worked on increasing NGO's and the public involvement in the field of climate change and environmental protection. In 2012 the ratification of the Aarhus Convention entered into force in Iceland, ensuring the public right to participation and information in environmental matters.

In 2001 The Ministry established a cooperation platform with environmental NGO's for the purpose of increasing dialogue and consultation. Today in all 19 NGOs participate in the platform, including Icelands largest organizations in this field. Many of them also receive a financial support for their operation from the government as well as funding for specific projects. Amongst those projects are the Eco-School project described before, a pilot project on reducing green-house gas emissions in municipalities and a long term educational project for youths on revegetation and landcare in connection to biodiversity and climate change. The government support diverse other NGOs projects which fully or partially aim at fighting climate change.

9.7 Participation in international activities

The Icelandic participation in international activities is of many sorts. The participation in the European Mobility Week, the Walk to School International project, Eco-Schools program and the Cittaslow movement are examples of participation in public projects across boarders and the UN University training programs (see 7.3) are examples of international cooperation with regards to education and training.
Icelandic authorities also participate in diverse international cooperation programs with regards to public information dissemination on the environment, including climate change. An example of this is the cooperation between Environment Agency of Iceland with the European Environment Agency. Press releases from the EEA concerning climate change developments are distributed by the member countries on agency/ministry websites and to national and local media. Information and best practice is also shared between member countries.

The Ministry for the Environment and Natural Resources has participated in the Green spider network (GSN), which is an active network of communication and information officers from environment Ministries and national environmental agencies in Europe, as well as a comparable network of information officers from the Nordic Countries. Both networks share experience and information and have annual meetings although there are uncertainties regarding the future of the GSN meetings.

Annex 1 Iceland‘s First Biennial Report

1. Introduction

Iceland‘s first biennial report under the UNFCCC is submitted as an annex to Iceland‘s 6th National Communication. The biennial report has been prepared in accordance with the UNFCCC biennial reporting guidelines (FCCC/CP/2011/9/Add.1).

The report provides information on greenhouse gas emissions and trends, on Iceland‘s quantified economy-wide emission reduction target, progress in achievement of quantified economy-wide emission reduction target, projections and provision of financial, technological and capacity-building support to developing country Parties.

2. Information on GHG emissions and trends

Iceland’s obligations in relation to the first commitment period of the Kyoto Protocol are as follows:

- For the first commitment period, from 2008 to 2012, the greenhouse gas emissions shall not increase more than 10% from the level of emissions in 1990.
- Decision 14/CP.7 on the “Impact of single project on emissions in the commitment period” allows Iceland to report certain industrial process carbon dioxide emissions separately and not include them in national totals; to the extent they would cause Iceland to exceed its assigned amount. For the first commitment period the carbon dioxide emissions falling under decision 14/CP.7 shall not exceed 8,000,000 tonnes.

In 2011, Iceland‘s total emissions of greenhouse gases were 4,413 thousand tonnes of CO_2-equivalent. The emissions had increased by 905 thousand tonnes CO_2-eq in 2011 compared to 1990 levels, an increase of 25,8%. Emissions of CO_2 in 2011 fulfilling the criteria in Decision 14/CP.7 were 1209 thousand tonnes CO_2-eq. Iceland is on track in meeting its obligations under the protocol, both with regard to the Kyoto limit (1990 emissions + 10%) and the provisions of Decision 14/CP.7.

The largest contribution of greenhouse gas emissions in Iceland in 2011 was from industrial processes (41%) followed in order of size by the energy sector (40%), agriculture (14,5%) and waste (4,5%). Emissions from the energy sector were dominated by transportation (49%) and fishing (29%). From 1990 to 2011, the contribution of industrial processes to the total emissions increased from 25% to 41%, while the contribution of the energy sector decreased from 51% to 40%.

Greenhouse gas emissions decreased between 1990 and 1994, mainly because reduced emissions of PFCs as a result of improved technology and process control in the aluminium industry. By the middle of the 1990s economic growth started to gain momentum in Iceland and total emissions increased with expansion in the production of non-ferrous metals. Greenhouse gas emissions peaked in 2008 and decreased thereafter in most sectors after onset of the financial crisis in late 2008. The emissions decreased on average by 4% per year in 2008 - 2011. Changes in emissions by source categories are shown in Figure A-1.

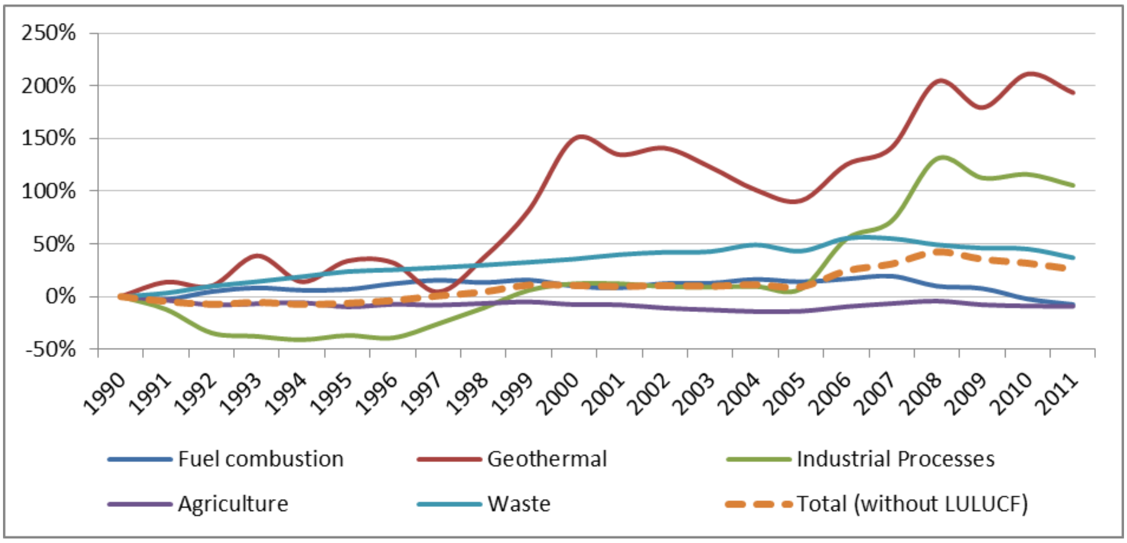

Figure A-1. Percentage changes in emissions of total greenhouse gas emissions by UNFCCC source categories during the period 1990-2011, compared to 1990 levels.

The largest share of greenhouse gases emitted in 2011 came from CO_2 emissions, with 76% of the total. Methane and nitrous oxide emissions contributed equally with 10% for each gas. The remaining 4% of total emissions were HFCs (2.7%), PFCs (1.4%) and SF_6 (0.07%).

Trends in emissions of greenhouse gases in 1990 to 2011 are shown in Figure A-2. The emissions of CO_2 increased steadily between 1990 and 2008 with leaps relating to startups of increased production capacity in the non-ferrous metal sector. Emissions of CO_2 declined after 2008. The emissions decreased by 2.9% between 2010 and 2011. The figure illustrates the effort made in the 1990 to reduce the emissions PFCs and shows how the emissions peak when production is increased in the aluminium sector and decline again when balance is reached in the production. PFC emissions decreased by 57% between 2010 and 2011. Emissions of HFCs have increased with increased use. Emissions of methane and nitrous oxide remained fairly stable throughout 1990 – 2011. Methane emissions increased by 9.4% between 1990 and 2011 while the emissions of nitrous oxides decreased by 13,9% during the same period.

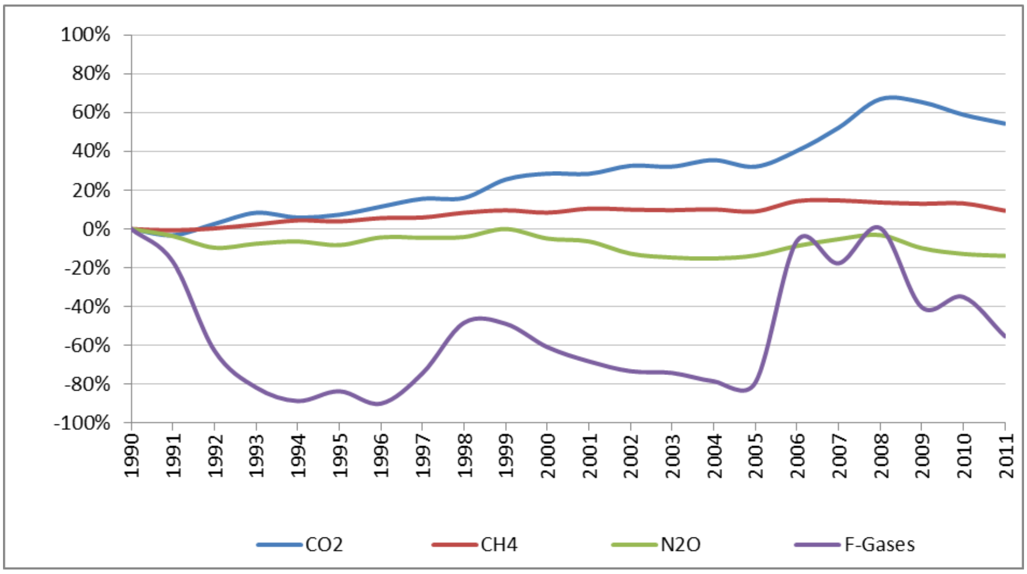

Figure A-2. Percentage changes in emissions of GHG by gas 1990-2011, compared to 1990 levels

National inventory arrangements

Act No. 70/2012 establishes the national system for the estimation of greenhouse gas emissions by sources and removals by sinks, a national registry, emission permits and establishes the legal basis for installations and aviation operators participating in the EU ETS.

The Envionment Agency of Iceland (EA) is designated as the responsible authority for the national accounting and the inventory of emissions and removals of greenhouse gases according to Iceland's international obligations. The Environment Agency compiles Iceland's greenhouse gas inventory. Main data suppliers are listed and the type of information they are responsible for collecting and reporting to the Environment Agency:

- Soil Conservation Service of Iceland (SCSI)
- Iceland Forest Service (IFS)
- National Energy Authority (NEA)
- Agricultural University of Iceland (AUI)
- Iceland Food and Veterinary Authority
- Statistics Iceland
- The Road Traffic Directorate
- The Icelandic Recycling Fund
- Directorate of Customs

The contact person at the Environment Agency of Iceland is:

Christoph Wöll
Environment Agency of Iceland
Suðurlandsbraut 24
IS-108 Reykjavík, Iceland

The annual inventory cycle describes individual activities performed each year in preparation for next submission of the emission estimates.

A new annual cycle begins with an initial planning of activities for the inventory cycle by the inventory team and major data providers as needed, taking into account the outcome of the internal and external review as well as the recommendations from the UNFCCC review. The initial planning is followed by a period assigned for compilation of the national inventory and improvement of the National System.

After compilation of activity data, emission estimates and uncertainties are calculated and quality checks performed to validate results. Emission data is received from the sectoral expert for LULUCF. All emission estimates are imported into the CRF Reporter software.

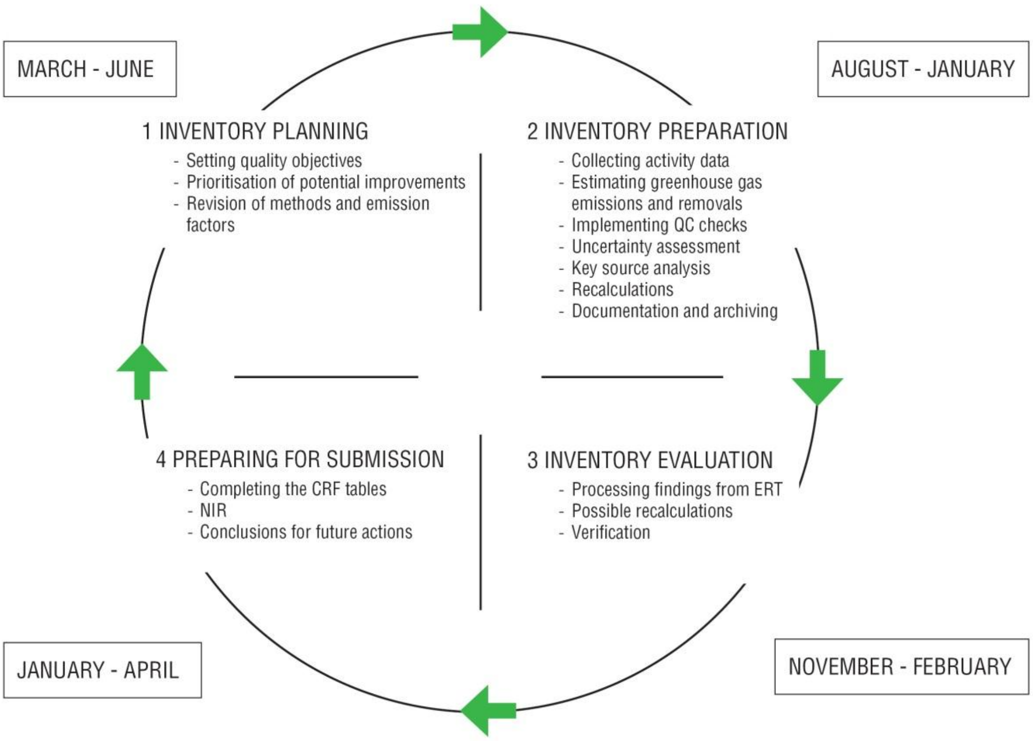

Figure A-3. The annual inventory cycle

A series of internal review activities are carried out annually to detect and rectify any anomalies in the estimates, e.g. time series variations, with priority given to emissions from industrial plants falling under Decision 14/CP.7, other key source categories and for those categories where data and methodological changes have recently occurred.

After an approval by the director and the inventory team at the EA, the greenhouse gas inventory is submitted to the UNFCCC by the EA.

Table 1 ISL_BR1_v0.2

Emission trends: summary [(1)]

(Sheet 1 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS EMISSIONS	Base year[a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
CO_2 emissions including net CO_2 from LULUCF	3,261.02	3,186.77	3,297.15	3,406.97	3,341.33	3,350.67	3,425.98	3,495.43	3,483.15
CO_2 emissions excluding net CO_2 from LULUCF	2,160.11	2,090.16	2,216.10	2,339.34	2,286.94	2,318.22	2,407.41	2,495.75	2,505.00
CH_4 emissions including CH_4 from LULUCF	407.80	409.50	413.65	421.70	430.39	428.23	436.58	437.78	447.86
CH_4 emissions excluding CH_4 from LULUCF	406.20	403.18	407.34	415.39	424.08	421.91	428.88	430.08	440.06
N_2O emissions including N_2O from LULUCF	589.79	570.80	539.86	550.70	556.88	547.43	568.39	567.87	570.22
N_2O emissions excluding N_2O from LULUCF	520.90	501.69	470.50	481.16	487.17	477.42	498.14	497.25	499.07
HFCs	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.67	1.41	8.51	15.31	23.72	35.72
PFCs	419.63	348.34	155.28	74.86	44.57	58.84	25.15	82.36	180.13
SF_6	1.15	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Total (including LULUCF)	4,679.39	4,516.71	4,407.24	4,456.21	4,375.89	4,394.99	4,472.72	4,608.46	4,718.40
Total (excluding LULUCF)	3,507.99	3,344.68	3,250.52	3,312.72	3,245.47	3,286.22	3,376.20	3,530.46	3,661.29

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
1. Energy	1,778.70	1,742.20	1,865.42	1,943.42	1,890.72	1,916.25	2,006.67	2,046.42	2,029.21
2. Industrial Processes	869.03	762.25	567.26	538.18	510.10	546.11	525.70	642.52	774.75
3. Solvent and Other Product Use	9.07	8.63	8.02	7.96	7.49	7.51	8.16	8.26	8.63
4. Agriculture	706.45	682.15	650.88	658.00	665.04	637.23	654.28	648.83	660.79
5. Land Use, Land-Use Change and Forestry[b]	1,171.40	1,172.04	1,156.72	1,143.49	1,130.42	1,108.77	1,096.51	1,078.00	1,057.11
6. Waste	144.75	149.44	158.95	165.17	172.11	179.12	181.39	184.44	187.90
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)	4,679.39	4,516.71	4,407.24	4,456.21	4,375.89	4,394.99	4,472.72	4,608.46	4,718.40

Note: All footnotes for this table are given on sheet 3.

[1] The common tabular format will be revised, in accordance with relevant decisions of the Conference of the Parties and, where applicable, with decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol."

Table 1 ISL_BR1_v0.2

Emission trends: summary [(1)]

(Sheet 2 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS EMISSIONS	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
CO_2 emissions including net CO_2 from LULUCF	3,668.11	3,710.62	3,693.34	3,765.44	3,734.68	3,781.85	3,674.82	3,832.12	4,072.59	4,377.83
CO_2 emissions excluding net CO_2 from LULUCF	2,710.12	2,775.92	2,773.28	2,862.86	2,854.60	2,926.44	2,852.93	3,029.32	3,286.41	3,605.13
CH_4 emissions including CH_4 from LULUCF	452.90	448.07	456.48	454.40	453.09	454.88	450.57	473.55	474.05	469.70
CH_4 emissions excluding CH_4 from LULUCF	445.09	440.26	448.67	446.59	445.29	447.07	442.77	464.45	465.82	461.48
N_2O emissions including N_2O from LULUCF	592.42	567.59	560.22	528.05	518.17	515.89	524.90	551.76	570.44	582.13
N_2O emissions excluding N_2O from LULUCF	520.74	495.07	487.20	454.34	444.03	441.27	449.68	475.15	493.35	504.19
HFCs	40.45	35.78	40.27	38.10	47.19	50.19	58.42	58.76	61.98	70.64
PFCs	173.21	127.16	91.66	72.54	59.79	38.58	26.10	333.22	281.13	349.00
SF_6	1.30	1.37	1.37	1.37	1.37	1.38	2.64	2.64	3.00	3.15
Total (including LULUCF)	4,928.40	4,890.60	4,843.34	4,859.90	4,814.29	4,842.77	4,737.45	5,252.05	5,463.19	5,852.45
Total (excluding LULUCF)	3,890.92	3,875.58	3,842.47	3,875.81	3,852.26	3,904.94	3,832.54	4,363.54	4,591.69	4,993.59

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
1. Energy	2,098.11	2,041.71	2,004.55	2,079.69	2,071.78	2,121.82	2,075.58	2,142.97	2,199.46	2,074.66
2. Industrial Processes	922.23	976.45	977.11	953.89	949.65	954.71	934.60	1,349.95	1,500.22	2,019.53
3. Solvent and Other Product Use	8.29	8.31	7.65	7.42	7.21	7.16	6.88	7.25	7.83	7.18
4. Agriculture	670.44	652.88	650.84	629.28	617.17	605.53	608.30	638.65	659.74	676.29
5. Land Use, Land-Use Change and Forestry[b]	1,037.48	1,015.02	1,000.87	984.09	962.02	937.83	904.91	888.51	871.50	858.86
6. Waste	191.85	196.23	202.32	205.53	206.46	215.72	207.17	224.71	224.44	215.93
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)	4,928.40	4,890.60	4,843.34	4,859.90	4,814.29	4,842.77	4,737.45	5,252.05	5,463.19	5,852.45

Note: All footnotes for this table are given on sheet 3.

Table 1 ISL_BR1_v0.2

Emission trends: summary (1)
(Sheet 3 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS EMISSIONS	*2009*	2010	2011	Change from base to latest reported year
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	(%)
CO_2 emissions including net CO_2 from LULUCF	4,319.39	4,140.42	3,991.45	22.40
CO_2 emissions excluding net CO_2 from LULUCF	3,571.84	3,431.81	3,332.75	54.29
CH_4 emissions including CH_4 from LULUCF	467.18	467.80	452.67	11.00
CH_4 emissions excluding CH_4 from LULUCF	458.85	459.47	444.34	9.39
N_2O emissions including N_2O from LULUCF	547.96	532.54	527.70	-10.53
N_2O emissions excluding N_2O from LULUCF	469.28	453.68	448.45	-13.91
HFCs	95.01	122.54	121.35	100.00
PFCs	152.75	145.63	63.22	-84.93
SF_6	3.17	4.89	3.13	172.33
Total (including LULUCF)	5,585.47	5,413.81	5,159.53	10.26
Total (excluding LULUCF)	4,750.90	4,618.01	4,413.25	25.81

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	2011	Change from base to latest reported year
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	(%)
1. Energy	2,021.22	1,869.15	1,769.76	-0.50
2. Industrial Processes	1,860.61	1,889.78	1,798.44	106.95
3. Solvent and Other Product Use	6.31	6.15	6.30	-30.50
4. Agriculture	651.43	642.84	640.68	-9.31
5. Land Use, Land-Use Change and Forestry [b]	834.57	795.80	746.28	-36.29
6. Waste	211.32	210.08	198.07	36.84
7. Other	NA	NA	NA	0.00
Total (including LULUCF)	5,585.47	5,413.81	5,159.53	10.26

Notes :

(1) Further detailed information could be found in the common reporting format tables of the Party's greenhouse gas inventory, namely "Emission trends (CO_2)", "Emission trends (CH_4)", "Emission trends (N_2O)" and "Emission trends (HFCs, PFCs and SF_6)", which is included in an annex to this biennial report.

(2) 2011 is the latest reported inventory year.

(3) 1 kt CO_2 eq equals 1 Gg CO_2 eq.

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Includes net CO_2, CH_4 and N_2O from LULUCF.

Emission trends (CO_2)
(Sheet 1 of 3)

CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year* [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	1,746.49	1,710.48	1,833.72	1,910.14	1,857.28	1,872.78	1,963.14	1,992.27	1,974.38
A. Fuel Combustion (Sectoral Approach)	1,685.13	1,640.53	1,766.11	1,824.76	1,787.16	1,790.55	1,881.87	1,928.42	1,890.68
1. Energy Industries	13.64	15.22	13.67	14.87	14.54	18.89	11.62	8.17	11.11
2. Manufacturing Industries and Construction	360.79	285.34	339.15	366.43	343.79	358.10	399.02	467.37	444.57
3. Transport	612.37	624.15	634.57	635.04	637.79	613.50	604.42	615.75	619.00
4. Other Sectors	698.33	715.83	778.72	808.43	791.04	800.06	866.82	837.12	815.99
5. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
B. Fugitive Emissions from Fuels	61.36	69.95	67.62	85.38	70.12	82.23	81.27	63.85	83.70
1. Solid Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Oil and Natural Gas	61.36	69.95	67.62	85.38	70.12	82.23	81.27	63.85	83.70
2. Industrial Processes	399.28	365.29	368.30	416.72	417.92	434.70	434.07	493.42	521.32
A. Mineral Products	52.28	48.65	45.69	39.68	37.37	37.87	41.78	46.55	54.39
B. Chemical Industry	0.36	0.31	0.25	0.24	0.35	0.46	0.40	0.44	0.40
C. Metal Production	346.63	316.32	322.36	376.80	380.20	396.37	391.89	446.44	466.53
D. Other Production	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Production of Halocarbons and SF6									
F. Consumption of Halocarbons and SF6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	3.07	3.20	3.20	3.21	3.20	3.21	3.45	3.55	3.80
4. 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. Other									
5. Land Use, Land-Use Change and Forestry	1,100.91	1,096.61	1,081.04	1,067.63	1,054.39	1,032.44	1,018.57	999.68	978.15
A. Forest Land	-44.24	-46.01	-51.10	-56.33	-59.22	-69.33	-74.12	-81.51	-89.67
B. Cropland	1,198.36	1,193.22	1,187.35	1,181.43	1,175.47	1,169.54	1,163.64	1,157.66	1,151.70
C. Grassland	-55.06	-57.96	-62.57	-64.82	-69.22	-75.12	-79.93	-85.45	-92.98
D. Wetlands	1.86	7.36	7.36	7.36	7.36	7.36	8.98	8.98	9.11
E. Settlements	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
6. Waste	11.27	11.18	10.88	9.27	8.54	7.53	6.75	6.50	5.51
A. Solid Waste Disposal on Land	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE
B. Waste-water Handling									
C. Waste Incineration	11.27	11.18	10.88	9.27	8.54	7.53	6.75	6.50	5.51
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other (as specified in the summary table in CRF)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total CO2 emissions including net CO2 from LULUCF	3,261.02	3,186.77	3,297.15	3,406.97	3,341.33	3,350.67	3,425.98	3,495.43	3,483.15
Total CO2 emissions excluding net CO2 from LULUCF	2,160.11	2,090.16	2,216.10	2,339.34	2,286.94	2,318.22	2,407.41	2,495.75	2,505.00
Memo Items:									
International Bunkers	318.65	259.64	263.56	293.02	307.10	380.15	395.45	440.80	514.67
Aviation	219.65	221.99	203.62	195.64	213.62	236.15	271.51	292.12	338.13
Marine	99.00	37.65	59.95	97.38	93.49	144.00	123.95	148.68	176.54
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO2 Emissions from Biomass	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO

Note: All footnotes for this table are given on sheet 3.

Table 1 (a) ISL_BR1_v0.2

Emission trends (CO_2)

(Sheet 2 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	2,031.73	1,975.42	1,939.14	2,014.81	2,007.69	2,052.17	1,998.59	2,066.21	2,121.33	1,999.42
A. Fuel Combustion (Sectoral Approach)	1,920.46	1,822.28	1,795.37	1,867.25	1,871.18	1,929.27	1,882.24	1,929.57	1,975.57	1,815.15
1. Energy Industries	8.24	7.24	6.55	8.52	7.79	7.43	9.22	8.49	23.81	7.92
2. Manufacturing Industries and Construction	470.11	423.71	470.93	473.73	425.39	458.70	419.21	406.89	386.54	344.25
3. Transport	640.69	642.83	653.53	657.22	751.18	803.26	808.94	951.27	986.01	932.13
4. Other Sectors	801.42	748.50	664.36	727.78	686.82	659.88	644.87	562.92	579.20	530.86
5. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
B. Fugitive Emissions from Fuels	111.27	153.15	143.77	147.57	136.51	122.90	116.36	136.65	145.76	184.27
1. Solid Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Oil and Natural Gas	111.27	153.15	143.77	147.57	136.51	122.90	116.36	136.65	145.76	184.27
2. Industrial Processes	670.41	792.55	826.74	840.90	840.36	863.60	846.48	954.33	1,153.08	1,595.86
A. Mineral Products	61.46	65.68	58.99	39.76	33.48	51.45	55.72	62.72	64.52	62.86
B. Chemical Industry	0.43	0.41	0.49	0.45	0.48	0.39	NA, NO	NA, NO	NA, NO	NA, NO
C. Metal Production	608.52	726.46	767.26	800.68	806.41	811.76	790.76	891.62	1,088.56	1,533.00
D. Other Production	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Production of Halocarbons and SF6										
F. Consumption of Halocarbons and SF6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	3.47	3.71	3.37	3.39	3.33	3.60	3.53	3.89	4.03	3.55
4. 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. Other										
5. Land Use, Land-Use Change and Forestry	957.99	934.70	920.06	902.58	880.07	855.41	821.88	802.80	786.19	772.70
A. Forest Land	-95.55	-107.07	-112.80	-120.89	-131.98	-138.95	-158.87	-165.34	-172.98	-177.07
B. Cropland	1,145.63	1,139.59	1,133.44	1,127.26	1,123.44	1,117.47	1,112.15	1,105.92	1,100.83	1,095.15
C. Grassland	-101.19	-106.93	-109.69	-112.90	-120.49	-132.38	-140.68	-147.99	-151.48	-155.06
D. Wetlands	9.11	9.11	9.11	9.11	9.11	9.11	9.11	9.11	9.60	9.60
E. Settlements	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	0.16	0.18	1.09	0.22	0.08
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
6. Waste	4.51	4.24	4.03	3.75	3.22	7.09	4.33	4.88	7.98	6.31
A. Solid Waste Disposal on Land	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE
B. Waste-water Handling										
C. Waste Incineration	4.51	4.24	4.03	3.75	3.22	7.09	4.33	4.88	7.98	6.31
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other (as specified in the summary table in CRF)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total CO2 emissions including net CO2 from LULUCF	3,668.11	3,710.62	3,693.34	3,765.44	3,734.68	3,781.85	3,674.82	3,832.12	4,072.59	4,377.83
Total CO2 emissions excluding net CO2 from LULUCF	2,710.12	2,775.92	2,773.28	2,862.86	2,854.60	2,926.44	2,852.93	3,029.32	3,286.41	3,605.13
Memo Items:										
International Bunkers	527.25	626.29	498.17	517.17	476.72	576.21	532.59	637.13	718.45	656.36
Aviation	363.37	407.74	349.13	309.85	333.00	380.00	421.63	499.89	511.53	427.83
Marine	163.88	218.55	149.04	207.32	143.72	196.21	110.96	137.23	206.92	228.53
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO2 Emissions from Biomass	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO

Note: All footnotes for this table are given on sheet 3.

Table 1(a) ISL_BR1_v0.2

Emission trends (CO_2)

(Sheet 3 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	2011	Change from base to latest reported year
	kt	kt	kt	%
1. Energy	1,952.48	1,807.12	1,712.12	-1.97
A. Fuel Combustion (Sectoral Approach)	1,784.02	1,618.13	1,533.43	-9.00
1. Energy Industries	8.81	6.69	6.85	-49.77
2. Manufacturing Industries and Construction	247.27	199.36	181.94	-49.57
3. Transport	905.31	861.59	826.36	34.94
4. Other Sectors	622.64	550.49	518.29	-25.78
5. Other	NA, NO	NA, NO	NA, NO	0.00
B. Fugitive Emissions from Fuels	168.45	188.99	178.68	191.21
1. Solid Fuels	NA, NO	NA, NO	NA, NO	0.00
2. Oil and Natural Gas	168.45	188.99	178.68	191.21
2. Industrial Processes	1,608.77	1,615.82	1,609.87	303.20
A. Mineral Products	30.05	10.64	21.15	-59.55
B. Chemical Industry	NA, NO	NA, NO	NA, NO	-100.00
C. Metal Production	1,578.72	1,605.18	1,588.72	358.33
D. Other Production	NE	NE	NE	0.00
E. Production of Halocarbons and SF6				
F. Consumption of Halocarbons and SF6				
G. Other	NA	NA	NA	0.00
3. Solvent and Other Product Use	3.16	2.74	2.81	-8.37
4. 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. Other				
5. Land Use, Land-Use Change and Forestry	747.56	708.61	658.70	-40.17
A. Forest Land	-191.03	-215.22	-250.67	466.62
B. Cropland	1,087.18	1,078.95	1,072.41	-10.51
C. Grassland	-158.40	-164.92	-173.21	214.59
D. Wetlands	9.72	9.72	9.72	423.61
E. Settlements	0.08	0.08	0.46	100.00
F. Other Land	NE	NE	NE	0.00
G. Other	NE, NO	NE, NO	NE, NO	0.00
6. Waste	7.43	6.13	7.96	-29.44
A. Solid Waste Disposal on Land	NA, NE	NA, NE	NA, NE	0.00
B. Waste-water Handling				
C. Waste Incineration	7.43	6.13	7.96	-29.44
D. Other	NA	NA	NA	0.00
7. Other (as specified in the summary table in CRF)	NA	NA	NA	0.00
Total CO2 emissions including net CO2 from LULUCF	4,319.39	4,140.42	3,991.45	22.40
Total CO2 emissions excluding net CO2 from LULUCF	3,571.84	3,431.81	3,332.75	54.29
Memo Items:				
International Bunkers	498.71	559.61	620.60	94.76
Aviation	333.88	377.26	421.93	92.09
Marine	164.84	182.35	198.66	100.68
Multilateral Operations	NO	NO	NO	0.00
CO2 Emissions from Biomass	NA, NO	NA, NO	NA, NO	0.00

Abbreviations : CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] The column “Base year” should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Fill in net emissions/removals as reported in CRF table Summary 1.A of the latest reported inventory year. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

Table 1(b) ISL_BR1_v0.2

Emission trends (CH_4)

(Sheet 1 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	0.25	0.26	0.27	0.27	0.27	0.25	0.26	0.25	0.25
A. Fuel Combustion (Sectoral Approach)	0.22	0.23	0.24	0.24	0.24	0.22	0.23	0.20	0.20
1. Energy Industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Manufacturing Industries and Construction	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
3. Transport	0.15	0.15	0.16	0.16	0.16	0.13	0.13	0.11	0.11
4. Other Sectors	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.07
5. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
B. Fugitive Emissions from Fuels	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.05
1. Solid Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Oil and Natural Gas	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.05
2. Industrial Processes	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02
A. Mineral Products	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
B. Chemical Industry	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
C. Metal Production	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02
D. Other Production									
E. Production of Halocarbons and SF6									
F. Consumption of Halocarbons and SF6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use									
4. Agriculture	13.07	12.70	12.42	12.42	12.47	12.01	12.18	12.10	12.36
A. Enteric Fermentation	11.61	11.27	11.04	11.05	11.11	10.67	10.83	10.75	10.97
B. Manure Management	1.45	1.43	1.38	1.37	1.36	1.33	1.36	1.34	1.39
C. Rice Cultivation	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
D. Agricultural Soils	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	0.08	0.30	0.30	0.30	0.30	0.30	0.37	0.37	0.37
A. Forest Land	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
B. Cropland	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
C. Grassland	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
D. Wetlands	0.08	0.30	0.30	0.30	0.30	0.30	0.37	0.37	0.37
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
6. Waste	5.99	6.22	6.68	7.06	7.43	7.80	7.95	8.11	8.32
A. Solid Waste Disposal on Land	5.68	5.87	6.34	6.75	7.13	7.52	7.68	7.84	8.08
B. Waste-water Handling	0.07	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11
C. Waste Incineration	0.25	0.25	0.24	0.21	0.19	0.17	0.16	0.15	0.13
D. Other	NO	NO	NO	NO	NO	0.01	0.01	0.01	0.01
7. Other (as specified in the summary table in CRF)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total CH4 emissions including CH4 from LULUCF	19.42	19.50	19.70	20.08	20.49	20.39	20.79	20.85	21.33
Total CH4 emissions excluding CH4 from LULUCF	19.34	19.20	19.40	19.78	20.19	20.09	20.42	20.48	20.96
Memo Items:									
International Bunkers	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02
Aviation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Marine	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO2 Emissions from Biomass									

Note: All footnotes for this table are given on sheet 3.

Table 1(b) ISL_BR1_v0.2

Emission trends (CH_4)

(Sheet 2 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	0.25	0.25	0.25	0.25	0.25	0.26	0.25	0.30	0.35	0.36
A. Fuel Combustion (Sectoral Approach)	0.17	0.17	0.16	0.17	0.17	0.17	0.15	0.16	0.16	0.15
1. Energy Industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Manufacturing Industries and Construction	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
3. Transport	0.08	0.08	0.08	0.08	0.09	0.09	0.07	0.09	0.09	0.08
4. Other Sectors	0.07	0.07	0.06	0.07	0.06	0.06	0.06	0.05	0.05	0.05
5. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
B. Fugitive Emissions from Fuels	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.14	0.19	0.21
1. Solid Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Oil and Natural Gas	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.14	0.19	0.21
2. Industrial Processes	0.03	0.04	0.04	0.05	0.04	0.05	0.05	0.05	0.05	0.04
A. Mineral Products	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
B. Chemical Industry	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NO	NO	NO	NO
C. Metal Production	0.03	0.04	0.04	0.05	0.04	0.05	0.05	0.05	0.05	0.04
D. Other Production										
E. Production of Halocarbons and SF6										
F. Consumption of Halocarbons and SF6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use										
4. Agriculture	12.36	11.89	12.00	11.73	11.60	11.42	11.51	11.71	11.91	12.03
A. Enteric Fermentation	10.96	10.54	10.62	10.40	10.29	10.13	10.20	10.34	10.50	10.62
B. Manure Management	1.39	1.35	1.38	1.33	1.31	1.29	1.31	1.37	1.41	1.41
C. Rice Cultivation	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
D. Agricultural Soils	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.43	0.39	0.39
A. Forest Land	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
B. Cropland	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
C. Grassland	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	0.00	NE, NO	NE, NO
D. Wetlands	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.43	0.39	0.39
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
6. Waste	8.56	8.78	9.07	9.24	9.31	9.56	9.27	10.06	9.88	9.55
A. Solid Waste Disposal on Land	8.33	8.55	8.86	8.93	9.01	9.29	9.02	9.79	9.64	9.32
B. Waste-water Handling	0.11	0.11	0.11	0.21	0.21	0.21	0.22	0.22	0.18	0.17
C. Waste Incineration	0.11	0.10	0.09	0.09	0.08	0.05	0.02	0.02	0.02	0.02
D. Other	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.04
7. Other (as specified in the summary table in CRF)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total CH4 emissions including CH4 from LULUCF	21.57	21.34	21.74	21.64	21.58	21.66	21.46	22.55	22.57	22.37
Total CH4 emissions excluding CH4 from LULUCF	21.19	20.96	21.37	21.27	21.20	21.29	21.08	22.12	22.18	21.98
Memo Items:										
International Bunkers	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02
Aviation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Marine	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.02
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO2 Emissions from Biomass										

Note: All footnotes for this table are given on sheet 3.

Table 1(b) ISL_BR1_v0.2

Emission trends (CH_4)

(Sheet 3 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	2011	Change from base to latest reported year
	kt	kt	kt	%
1. Energy	0.38	0.33	0.29	13.75
A. Fuel Combustion (Sectoral Approach)	0.15	0.14	0.13	-41.86
1. Energy Industries	0.00	0.00	0.00	432.51
2. Manufacturing Industries and Construction	0.01	0.01	0.01	-42.69
3. Transport	0.08	0.08	0.07	-50.26
4. Other Sectors	0.06	0.05	0.05	-24.83
5. Other	NA, NO	NA, NO	NA, NO	0.00
B. Fugitive Emissions from Fuels	0.23	0.20	0.16	395.04
1. Solid Fuels	NA, NO	NA, NO	NA, NO	0.00
2. Oil and Natural Gas	0.23	0.20	0.16	395.04
2. Industrial Processes	0.04	0.04	0.04	42.84
A. Mineral Products	NE, NO	NE, NO	NE, NO	0.00
B. Chemical Industry	NO	NO	NO	0.00
C. Metal Production	0.04	0.04	0.04	42.84
D. Other Production				
E. Production of Halocarbons and SF6				
F. Consumption of Halocarbons and SF6				
G. Other	NA	NA	NA	0.00
3. Solvent and Other Product Use				
4. Agriculture	12.16	12.25	12.23	-6.39
A. Enteric Fermentation	10.75	10.84	10.81	-6.94
B. Manure Management	1.42	1.41	1.42	-1.93
C. Rice Cultivation	NA, NO	NA, NO	NA, NO	0.00
D. Agricultural Soils	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00
E. Prescribed Burning of Savannas	NA	NA	NA	0.00
F. Field Burning of Agricultural Residues	NA, NO	NA, NO	NA, NO	0.00
G. Other	NA	NA	NA	0.00
5. Land Use, Land-Use Change and Forestry	0.40	0.40	0.40	420.67
A. Forest Land	NE, NO	NE, NO	NE, NO	0.00
B. Cropland	NE, NO	NE, NO	NE, NO	0.00
C. Grassland	NE, NO	NE, NO	NE, NO	0.00
D. Wetlands	0.40	0.40	0.40	420.67
E. Settlements	NE	NE	NE	0.00
F. Other Land	NE	NE	NE	0.00
G. Other	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00
6. Waste	9.26	9.26	8.60	43.44
A. Solid Waste Disposal on Land	9.03	9.01	8.36	47.18
B. Waste-water Handling	0.17	0.17	0.17	149.95
C. Waste Incineration	0.02	0.01	0.01	-94.43
D. Other	0.05	0.06	0.06	100.00
7. Other (as specified in the summary table in CRF)	NA	NA	NA	0.00
Total CH4 emissions including CH4 from LULUCF	22.25	22.28	21.56	11.00
Total CH4 emissions excluding CH4 from LULUCF	21.85	21.88	21.16	9.39
Memo Items:				
International Bunkers	0.02	0.02	0.02	95.85
Aviation	0.00	0.00	0.00	92.07
Marine	0.02	0.02	0.02	96.47
Multilateral Operations	NO	NO	NO	0.00
CO2 Emissions from Biomass				

Abbreviations : CRF = common reporting format, LULUCF = land use, land-use change and

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Table 1(c) ISL_BR1_v0.2

Emission trends (N_2O)

(Sheet 1 of 3)

CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	0.09	0.08	0.08	0.09	0.09	0.12	0.12	0.16	0.16
A. Fuel Combustion (Sectoral Approach)	0.09	0.08	0.08	0.09	0.09	0.12	0.12	0.16	0.16
1. Energy Industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Manufacturing Industries and Construction	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.07
3. Transport	0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.06	0.06
4. Other Sectors	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
5. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
B. Fugitive Emissions from Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
1. Solid Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Oil and Natural Gas	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Industrial Processes	0.16	0.15	0.14	0.14	0.14	0.14	0.16	0.13	0.12
A. Mineral Products	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
B. Chemical Industry	0.16	0.15	0.14	0.14	0.14	0.14	0.16	0.13	0.12
C. Metal Production	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Other Production									
E. Production of Halocarbons and SF6									
F. Consumption of Halocarbons and SF6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02
4. Agriculture	1.39	1.34	1.26	1.28	1.30	1.24	1.29	1.27	1.29
A. Enteric Fermentation									
B. Manure Management	0.17	0.16	0.14	0.14	0.14	0.13	0.14	0.14	0.14
C. Rice Cultivation									
D. Agricultural Soils	1.23	1.18	1.12	1.14	1.16	1.11	1.15	1.14	1.15
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23
A. Forest Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Cropland	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO
C. Grassland	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
D. Wetlands	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.23
6. Waste	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
A. Solid Waste Disposal on Land									
B. Waste-water Handling	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
C. Waste Incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00
7. Other (as specified in the summary table in CRF)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total N2O emissions including N2O from LULUCF	1.90	1.84	1.74	1.78	1.80	1.77	1.83	1.83	1.84
Total N2O emissions excluding N2O from LULUCF	1.68	1.62	1.52	1.55	1.57	1.54	1.61	1.60	1.61
Memo Items:									
International Bunkers	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Marine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO2 Emissions from Biomass									

Note: All footnotes for this table are given on sheet 3.

Table 1(c)

ISL_BR1_v0.2

Emission trends (N_2O)

(Sheet 2 of 3)

CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	0.20	0.20	0.19	0.19	0.19	0.21	0.23	0.23	0.23	0.22
A. Fuel Combustion (Sectoral Approach)	0.20	0.20	0.19	0.19	0.19	0.21	0.23	0.23	0.23	0.22
1. Energy Industries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Manufacturing Industries and Construction	0.08	0.08	0.08	0.08	0.07	0.08	0.09	0.08	0.08	0.08
3. Transport	0.10	0.09	0.10	0.10	0.10	0.11	0.12	0.13	0.13	0.13
4. Other Sectors	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01
5. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
B. Fugitive Emissions from Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
1. Solid Fuels	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Oil and Natural Gas	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
2. Industrial Processes	0.12	0.06	0.05	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
A. Mineral Products	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
B. Chemical Industry	0.12	0.06	0.05	NE, NO	NE, NO	NE, NO	NO	NO	NO	NO
C. Metal Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Other Production										
E. Production of Halocarbons and SF6										
F. Consumption of Halocarbons and SF6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4. Agriculture	1.33	1.30	1.29	1.24	1.20	1.18	1.18	1.27	1.32	1.37
A. Enteric Fermentation										
B. Manure Management	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.13
C. Rice Cultivation										
D. Agricultural Soils	1.18	1.16	1.15	1.10	1.07	1.05	1.05	1.13	1.18	1.23
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.25	0.25	0.25
A. Forest Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B. Cropland	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO
C. Grassland	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	0.00	NE, NO	NE, NO
D. Wetlands	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NE, NO	0.00	NA, NE, NO	NA, NE, NO
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.25
6. Waste	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
A. Solid Waste Disposal on Land										
B. Waste-water Handling	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03
C. Waste Incineration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D. Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Other (as specified in the summary table in CRF)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total N2O emissions including N2O from LULUCF	1.91	1.83	1.81	1.70	1.67	1.66	1.69	1.78	1.84	1.88
Total N2O emissions excluding N2O from LULUCF	1.68	1.60	1.57	1.47	1.43	1.42	1.45	1.53	1.59	1.63
Memo Items:										
International Bunkers	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02
Aviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Marine	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO2 Emissions from Biomass										

Note: All footnotes for this table are given on sheet 3.

Table 1(c) ISL_BR1_v0.2

Emission trends (N_2O)

(Sheet 3 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	2011	Change from base to latest reported year
	kt	kt	kt	%
1. Energy	0.20	0.18	0.17	91.93
A. Fuel Combustion (Sectoral Approach)	0.20	0.18	0.17	91.93
1. Energy Industries	0.00	0.00	0.00	539.39
2. Manufacturing Industries and Construction	0.05	0.04	0.04	-28.47
3. Transport	0.13	0.12	0.12	573.27
4. Other Sectors	0.02	0.01	0.01	-24.57
5. Other	NA, NO	NA, NO	NA, NO	0.00
B. Fugitive Emissions from Fuels	NA, NO	NA, NO	NA, NO	0.00
1. Solid Fuels	NA, NO	NA, NO	NA, NO	0.00
2. Oil and Natural Gas	NA, NO	NA, NO	NA, NO	0.00
2. Industrial Processes	NA, NE, NO	NA, NE, NO	NA, NE, NO	-100.00
A. Mineral Products	NE, NO	NE, NO	NE, NO	0.00
B. Chemical Industry	NO	NO	NO	-100.00
C. Metal Production	NA	NA	NA	0.00
D. Other Production				
E. Production of Halocarbons and SF6				
F. Consumption of Halocarbons and SF6				
G. Other	NA	NA	NA	0.00
3. Solvent and Other Product Use	0.01	0.01	0.01	-41.83
4. Agriculture	1.28	1.24	1.24	-11.17
A. Enteric Fermentation				
B. Manure Management	0.14	0.14	0.14	-15.72
C. Rice Cultivation				
D. Agricultural Soils	1.14	1.11	1.10	-10.54
E. Prescribed Burning of Savannas	NA	NA	NA	0.00
F. Field Burning of Agricultural Residues	NA, NO	NA, NO	NA, NO	0.00
G. Other	NA	NA	NA	0.00
5. Land Use, Land-Use Change and Forestry	0.25	0.25	0.26	15.04
A. Forest Land	0.00	0.00	0.00	294.55
B. Cropland	IE, NA, NE, NO	IE, NA, NE, NO	IE, NA, NE, NO	0.00
C. Grassland	NE, NO	NE, NO	NE, NO	0.00
D. Wetlands	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00
E. Settlements	NE	NE	NE	0.00
F. Other Land	NE	NE	NE	0.00
G. Other	0.25	0.25	0.25	13.78
6. Waste	0.03	0.03	0.03	25.91
A. Solid Waste Disposal on Land				
B. Waste-water Handling	0.03	0.03	0.03	28.16
C. Waste Incineration	0.00	0.00	0.00	-79.75
D. Other	0.00	0.00	0.00	100.00
7. Other (as specified in the summary table in CRF)	NA	NA	NA	0.00
Total N2O emissions including N2O from LULUCF	1.77	1.72	1.70	-10.53
Total N2O emissions excluding N2O from LULUCF	1.51	1.46	1.45	-13.91
Memo Items:				
International Bunkers	0.01	0.02	0.02	93.41
Aviation	0.01	0.01	0.01	92.07
Marine	0.00	0.00	0.01	96.47
Multilateral Operations	NO	NO	NO	0.00
CO2 Emissions from Biomass				

Abbreviations : CRF = common reporting format, LULUCF = land use, land-use change and

[a] The column “Base year” should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Table 1(d) ISL_BR1_v0.2

Emission trends (HFCs, PFCs and SF_6)

(Sheet 1 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year [a]*	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
Emissions of HFCsc - (kt CO2 eq)	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.67	1.41	8.51	15.31	23.72	35.72
HFC-23	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-32	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO
HFC-41	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-43-10mee	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-125	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00	0.00	0.00	0.00	0.01
HFC-134	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-134a	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00	0.00	0.00	0.00	0.00	0.00
HFC-152a	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00	0.00	0.00	0.00	0.00
HFC-143	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-143a	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.00	0.00	0.00	0.00
HFC-227ea	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-236fa	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-245ca	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed HFCsd - (kt CO_2 eq)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of PFCsc - (kt CO2 eq)	419.63	348.34	155.28	74.86	44.57	58.84	25.15	82.36	180.13
CF_4	0.05	0.05	0.02	0.01	0.01	0.01	0.00	0.01	0.02
C_2F_6	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C 3F8	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_4F_{10}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
$c\text{-}C_4F_8$	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_5F_{12}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_6F_{14}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed PFCs(4) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of SF6(3) - (Gg CO2 equivalent)	1.15	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
SF_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: All footnotes for this table are given on sheet 3.

Table 1(d) ISL_BR1_v0.2

Emission trends (HFCs, PFCs and SF_6)

(Sheet 2 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
Emissions of HFCsc - (kt CO2 eq)	40.45	35.78	40.27	38.10	47.19	50.19	58.42	58.76	61.98	70.64
HFC-23	NA, NO	NA, NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-41	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-43-10mee	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-125	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
HFC-134	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-134a	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
HFC-152a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFC-143	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-143a	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
HFC-227ea	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	0.00	0.00	0.00	0.00	0.00
HFC-236fa	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-245ca	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed HFCsd - (kt CO_2 eq)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of PFCsc - (kt CO2 eq)	173.21	127.16	91.66	72.54	59.79	38.58	26.10	333.22	281.13	349.00
CF_4	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.04	0.04	0.05
C_2F_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
C 3F8	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_4F_{10}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
$c\text{-}C_4F_8$	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_5F_{12}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_6F_{14}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed PFCs(4) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of SF6(3) - (Gg CO2 equivalent)	1.30	1.37	1.37	1.37	1.37	1.38	2.64	2.64	3.00	3.15
SF_6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: All footnotes for this table are given on sheet 3.

Table 1(d) ISL_BR1_v0.2

Emission trends (HFCs, PFCs and SF_6)

(Sheet 3 of 3) CRF: ISL_CRF__ v1.1

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	2011	Change from base to latest reported year
	kt	kt	kt	%
Emissions of HFCsc - (kt CO2 eq)	95.01	122.54	121.35	100.00
HFC-23	0.00	0.00	0.00	100.00
HFC-32	0.00	0.00	0.00	100.00
HFC-41	NA, NO	NA, NO	NA, NO	0.00
HFC-43-10mee	NA, NO	NA, NO	NA, NO	0.00
HFC-125	0.01	0.02	0.02	100.00
HFC-134	NA, NO	NA, NO	NA, NO	0.00
HFC-134a	0.01	0.02	0.01	100.00
HFC-152a	0.00	0.00	0.00	100.00
HFC-143	NA, NO	NA, NO	NA, NO	0.00
HFC-143a	0.01	0.02	0.02	100.00
HFC-227ea	0.00	0.00	0.00	100.00
HFC-236fa	NA, NO	NA, NO	NA, NO	0.00
HFC-245ca	NA, NO	NA, NO	NA, NO	0.00
Unspecified mix of listed HFCsd - (kt CO_2 eq)	NA, NO	NA, NO	NA, NO	0.00
Emissions of PFCsc - (kt CO2 eq)	152.75	145.63	63.22	-84.93
CF_4	0.02	0.02	0.01	-84.94
C_2F_6	0.00	0.00	0.00	-84.93
C 3F8	0.00	0.00	0.00	100.00
C_4F_{10}	NA, NO	NA, NO	NA, NO	0.00
c-C_4F_8	NA, NO	NA, NO	NA, NO	0.00
C_5F_{12}	NA, NO	NA, NO	NA, NO	0.00
C_6F_{14}	NA, NO	NA, NO	NA, NO	0.00
Unspecified mix of listed PFCs(4) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO	0.00
Emissions of SF6(3) - (Gg CO2 equivalent)	3.17	4.89	3.13	172.33
SF_6	0.00	0.00	0.00	172.33

Abbreviations : CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[c] Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO2 equivalent emissions.

[d] In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", 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.)

3. Quantified economy-wide emission reduction target

Iceland has committed to a quantified economy-wide emission reduction target of 20% below 1990 levels by 2020 to be fulfilled jointly with the EU and its 28 Member States. Information on Iceland's target has been communicated to the UNFCCC and can be found in document FCCC/AWGLCA/2012/MISC.1/Add.2[14].

Table 2(a) BR v0.1, Iceland

Description of quantified economy-wide emission reduction target: base year[a]

Party	*Iceland*	
Base year /base period		
Emission reduction target	% of base year/base period	% of 1990 [b] 20
Period for reaching target	BY-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.

Comment: The QELRC for Iceland for a second commitment period under the Kyoto Protocol is based on the understanding that it will be fulfilled jointly with the European Union and its member States, in accordance with Article 4 of the Kyoto Protocol

[14] http://unfccc.int/resource/docs/2012/awglca15/eng/misc01a02.pdf

Table 2(b) ISL_BR1_v0.2

Description of quantified economy-wide emission reduction target: gases and sectors covered[a]

Gases covered		*Base year for each gas (year):*
CO_2		1990
CH_4		1990
N_2O		1990
HFCs		1990
PFCs		1990
SF_6		1990
NF_3		To be determined
Other Gases (specify)		
Sectors covered[b]	Energy	Yes
	Transport[f]	Yes
	Industrial processes[g]	Yes
	Agriculture	Yes
	LULUCF	Yes
	Waste	Yes
	Other Sectors (specify)	

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.

[f] Transport is reported as a subsector of the energy sector.

[g] Industrial processes refer to the industrial processes and solvent and other product use sectors.

Table 2(c) ISL_BR1_v0.2

Description of quantified economy-wide emission reduction target: global warming potential values (GWP)[a]

Gases	*GWP values* [b]
CO_2	4nd AR
CH_4	4nd AR
N_2O	4nd AR
HFCs	4nd AR
PFCs	4nd AR
SF_6	4nd AR
NF_3	4nd AR
Other Gases (specify)	

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.

Table 2(d) ISL_BR1_v0.2

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	Excluded
	Contribution of LULUCF is calculated using	Activity-based approach

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.

Market-based mechanism

Iceland anticipates zero carry-over of credits from the first commitment period of the Kyoto Protocol. In Iceland's Climate Mitigation Action Plan to 2020, no acquiring of carbon credits through mechanisms is expected. Iceland will, however, retain an option to use market-based mechanisms to acquire carbon credits during the second commitment period, in line with the rules of relevant EU climate legislation applicable for Iceland.

Table 2(e)I BR v0.1, Iceland

Description of quantified economy-wide emission reduction target: market-based mechanisms under the Convention[a]

Market-based mechanisms under the Convention	*Possible scale of contributions (estimated kt CO_2 eq)*
CERs	
ERUs	
AAUs[i]	
Carry-over units[j]	
Other mechanism units under the Convention (specify)[d]	

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 ISL_BR1_v0.2

Description of quantified economy-wide emission reduction target: other market-based mechanisms[a]

Other market-based mechanisms	*Possible scale of contributions*
(Specify)	*(estimated kt CO_2 eq)*

[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) ISL_BR1_v0.2

Description of quantified economy-wide emission reduction target: any other information[a,b]

The QELRC for Iceland for a second commitment period under the Kyoto Protocol is based on the understanding that it will be fulfilled jointly with the European Union and its member States, in accordance with Article 4 of the Kyoto Protocol.

GWP values from the 4th AR will be used in calculating compliance with quantified emission wide reduction target. The GHG projection produced for the NC6 and BR1, however, still uses GWP values from the 2nd AR in order to provide comparability with the GHG inventory submitted to the UNFCCC.

[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.

4. Progress in achievement of quantified economy-wide emission reduction target

The Icelandic government adopted a Climate Change Strategy in 2007. It is conceived as a framework for action and government involvement in climate change issues. The Strategy sets forth a long-term vision for the reduction of net emissions of greenhouse gases by 50-75% until the year 2050, using 1990 emissions figures as a baseline. Emphasis is placed on reducing net emissions by the most economical means possible and in a way that provides additional benefits, by actions such as including the introduction of new low- and zero-carbon technology, economic instruments, carbon sequestration in vegetation and soil, and financing climate-friendly measures in other countries.

A Climate Change Action Plan was endorsed by the government in 2010. The Action Plan is a main instrument for defining and implementing actions to reduce emissions of greenhouse gases and enhance carbon sequestration. Ten key action and 22 additional actions are specified in the Action Plan. These are actions and projects focusing on mitigation or sequestration that are being implemented or being planned by authorites. A committee appointed in 2011 oversees the implementation of the action plan, makes proposals for new projects, and provides information and advice. The committee submits annual progress reports to the Minister for the Environment and Natural Resources.

Icelandic environmental legislation has become aligned with European legislation through the participation in the Agreement on the European Economic Area. A number of European legislative measures to mitigate climate change have been implemented, including participation in the EU emission trading system, development of the national renewable energy action plan for the promotion of the use of energy from renewable sources in accordance with Directive 2009/28/EC, regulation on certain fluorinated greenhouse gases and regulations on waste management.

Further information on policies and measures can be found in Chapter 4 of the 6th National Communication.

Table 3 ISL_BR1_v0.2

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) affected*	*Objective and/or activity affected*	*Type of instrument* [c]	*Status of implementation* [d]	*Brief description* [e]	*Start year of implementation*	*Implementing entity or entities*	*Estimate of mitigation impact (not cumulative, in kt CO_2 eq)*	
Carbon tax	Transport, Energy	CO_2	Reduce emissions from fossil fuels	Fiscal	Implemented	Tax on liquid and gaseous fossil fuels	2010	Ministry of Finance and Economic Affairs		75.00
Grants for geothermal exploration in cold areas	Energy	CO_2	Reduced emissions from fossil fuels	Economic	Implemented	Grants for geothermal exploration in cold areas based on Act No. 78/2002	2002	National Energy Authority		NE
Excise duty on vehicles based on CO2 emissions	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	The excise duty varies from 0% to 60% depending on CO2 emissions.	2011	Ministry of Finance and Economic Affairs		60.00
Biannual fee on vehicles based on CO2 emissions	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	Basic fee with additional fee for higher emission levels or weight depending on weight class	2011	Ministry of Finance and Economic Affairs		IE
No VAT on zero-emission vehicles with a cap	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	Electric, hydrogen and hybrid vehicles are exempted from VAT up to a certain maximum limit.	2012	Ministry of Finance and Economic Affairs		IE
Exemption from excise duty and carbon tax for CO2 neutral fuels	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	Non-fossil fuels are not subject to excise duty or carbon tax	2011	Ministry of Finance and Economic Affairs		IE
Reduced excise duty and semiannual car tax on methane vehicles	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	Methane vehicles get a discount from levied excise duty and pay only minimum semiannual car tax	2011	Ministry of Finance and Economic Affairs		IE
Increased public transportation and cycling	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	The Icelandic Road and Coastal Administration suports public transportation and construction of bike and walking paths	2012	Ministry of the Interior, municipalities		30.00
Parking benefits for low emission vehicles	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	Vehicles emitting less than 120 g CO2/km and weighing less than 1600 kg are eligible for free 90 min parking in Reykjavik	2007	City of Reykjavik		IE
Low-emission vehicles in public procurement	Transport	CO_2	Reduce emissions from transport	Fiscal	Implemented	Low emitting vehicles are favored in procurement for ministries and the city of Reykjavik	2011	Ministries and the City of Reykjavik		IE
EU emission trading scheme	Transport	CO_2	Reduce emissions from aviation	Economic	Implemented	Tradable emission allowances for flights within the EEA-area.	2012	Environment Agency of Iceland		125.00
Renewables in transport fuel	Transport	CO_2	Reduce fossil carbon in transport fuels	Regulatory	Implemented	Requirement of a minimum percentage of renewables in fuel used for land transport	2014	National Energy Authority		NE
EU emission trading scheme	Industry/industrial processes	CO_2, PFCs	Reduce emissions from industry	Economic	Implemented	Cap set on emissions from certain installations. The cap is reduced over time. An EEA wide market with emission permits.	2013	Environment Agency of Iceland		IE
Landfill policy	Waste management/waste	CH_4	Reduced organic waste in landfills	Regulatory	Implemented	The share of organic waste shall have been reduced to 75% of total waste in 2009, 50% in 2013 and 35% in 2020, with 2005 as a reference year	2009	Environment Agency of Iceland		NE
Landfill policy	Waste management/waste	CH_4	Collection of landfill gas	Regulatory	Implemented	Regulation No. 738/2003 on landfilling of waste, requires collection of landfill gases.	2003	Environment Agency of Iceland		NE
Shift from heavy oil to electricity in fishmeal production	Industry/industrial processes	CO_2	Reduce emissions from fossil fuels	Voluntary Agreement	Implemented	Conversion from oil based production to electricity based	2000	Industry		37.50

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.

[f] Optional year or years deemed relevant by the Party.

Custom Footnotes

Carbon tax is estimated to result in 50-100 kt CO_2 mitigatioon by 2020. The mean value of this range is given here.

Excise duty on vehicles based on CO2 emissions is estimated to have a mitigation impact of 20 - 100 kt CO2 by 2020 in combination with all other actions regarding changes in taxes on vehicles and fuels. The mean of this range is given here. The mitigation impacts of these other actions are therefore provided with the notation key IE.

Increased public transport and cycling is estimated to have an mitigation impact of 20 - 40 kt CO_2 by 2020. The mean of this range is given here.

The EU emission trading scheme is estimated to have a mitigation impact of 100 -150 kt CO_2 by 2020. the mean of this range is given here. The value refers to both aviation and installations.

Shift from heavy oil to electricity in fishmeal production is estimated to result in 25 - 50 kt CO_2 mitigation. The mean of this range is given here.

Reporting on progress[a, b]

	Total emissions excluding LULUCF	*Contribution from LULUCF*[d]	*Quantity of units from market based mechanisms under the Convention*		*Quantity of units from other market based mechanisms*	
Year[c]	*(kt CO_2 eq)*	*(kt CO_2 eq)*	*(number of units)*	*(kt CO_2 eq)*	*(number of units)*	*(kt CO_2 eq)*
(1990)	3,507.99	1,171.40				
2010	4,618.01	795.80				
2011	4,413.25	746.28				
2012	NE	NE				

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.

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 2011 [a,b]

	Net GHG emissions/removals from LULUCF categories [c]	*Base year/period or reference level value* [d]	*Contribution from LULUCF for reported year*	*Cumulative contribution from LULUCF* [e]	*Accounting approach* [f]
	(kt CO_2 eq)				
Total LULUCF					Activity-based approach
A. Forest land					Activity-based approach
1. Forest land remaining forest land					Activity-based approach
2. Land converted to forest land					Activity-based approach
3. Other [g]					Activity-based approach
B. Cropland					Activity-based approach
1. Cropland remaining cropland					Activity-based approach
2. Land converted to cropland					Activity-based approach
3. Other [g]					Activity-based approach
C. Grassland					Activity-based approach
1. Grassland remaining grassland					Activity-based approach
2. Land converted to grassland					Activity-based approach
3. Other [g]					Activity-based approach
D. Wetlands					Activity-based approach
1. Wetland remaining wetland					Activity-based approach
2. Land converted to wetland					Activity-based approach
3. Other [g]					Activity-based approach
E. Settlements					Activity-based approach
1. Settlements remaining settlements					Activity-based approach
2. Land converted to settlements					Activity-based approach
3. Other [g]					Activity-based approach
F. Other land					Activity-based approach
1. Other land remaining other land					Activity-based approach
2. Land converted to other land					Activity-based approach
3. Other [g]					Activity-based approach
Harvested wood products					Activity-based approach

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 2011 and 2012, where 2014 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 the reporting under the Convention or its Kyoto Protocol, explain in the biennial report how the value was derived.

[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.

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 2012 [a, b]

	Net GHG emissions/removals from LULUCF categories [c]	*Base year/period or reference level value [d]*	*Contribution from LULUCF for reported year*	*Cumulative contribution from LULUCF [e]*	*Accounting approach [f]*
	(kt CO_2 eq)				
Total LULUCF					Activity-based approach
A. Forest land					Activity-based approach
1. Forest land remaining forest land					Activity-based approach
2. Land converted to forest land					Activity-based approach
3. Other [g]					Activity-based approach
B. Cropland					Activity-based approach
1. Cropland remaining cropland					Activity-based approach
2. Land converted to cropland					Activity-based approach
3. Other [g]					Activity-based approach
C. Grassland					Activity-based approach
1. Grassland remaining grassland					Activity-based approach
2. Land converted to grassland					Activity-based approach
3. Other [g]					Activity-based approach
D. Wetlands					Activity-based approach
1. Wetland remaining wetland					Activity-based approach
2. Land converted to wetland					Activity-based approach
3. Other [g]					Activity-based approach
E. Settlements					Activity-based approach
1. Settlements remaining settlements					Activity-based approach
2. Land converted to settlements					Activity-based approach
3. Other [g]					Activity-based approach
F. Other land					Activity-based approach
1. Other land remaining other land					Activity-based approach
2. Land converted to other land					Activity-based approach
3. Other [g]					Activity-based approach
Harvested wood products					Activity-based approach

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 2011 and 2012, where 2014 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 the reporting under the Convention or its Kyoto Protocol, explain in the biennial report how the value was derived.

[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.

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]

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	*Base year* [d]	*Net emissions/removals* [e]					*Accounting parameters* [h]	*Accounting quantity* [i]
		2008	2009	*2010*	*2011*	Total[g]		
	($kt\ CO_2$ eq)							
A. Article 3.3 activities								
A.1. Afforestation and Reforestation								-517.33
A.1.1. Units of land not harvested since the beginning of the commitment periodj		-103.24	-115.64	-135.65	-162.80	-517.33		-517.33
A.1.2. Units of land harvested since the beginning of the commitment periodj								NA
A.2. Deforestation		0.08	0.08	0.08	0.46	0.69		0.69435
B. Article 3.4 activities								
B.1. Forest Management (if elected)		NA	NA	NA	NA	NA		NA
3.3 offset[k]							0	NA
FM cap[l]							0	NA
B.2. Cropland Management (if elected)	NA	NA	NA	NA	NA	NA	NA	NA
B.3. Grazing Land Management (if elected)	NA	NA	NA	NA	NA	NA	NA	NA
B.4. Revegetation (if elected)	-349.1198	-501.53	-508.71	-515.98	-523.45	-2,049.67	-1396.4792	-653.19389

Note: 1 kt CO_2 eq equals 1 Gg CO_2 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

[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.

Table 4(b) ISL_BR1_v0.2

Reporting on progress [a, b, c]

Units of market based mechanisms			*Year*	
			2011	*2012*
Kyoto Protocol units [d]	*Kyoto Protocol units*	*(number of units)*		
		(kt CO_2 eq)		
	AAUs	*(number of units)*		
		(kt CO2 eq)		
	ERUs	*(number of units)*		
		(kt CO2 eq)		
	CERs	*(number of units)*		
		(kt CO2 eq)		
	tCERs	*(number of units)*		
		(kt CO2 eq)		
	lCERs	*(number of units)*		
		(kt CO2 eq)		
Other units [d,e]	*Units from market-based mechanisms under the Convention*	*(number of units)*		
		(kt CO_2 eq)		
	Units from other market-based mechanisms	*(number of units)*		
		(kt CO_2 eq)		
Total		*(number of units)*		
		(kt CO_2 eq)		

Abbreviations : AAUs = assigned amount units, CERs = certified emission reductions, ERUs = emission reduction units, lCERs = long-term certified emission reductions, tCERs = temporary certified emission reductions.

Note: 2011 is the latest reporting year.

[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 rows for each market-based mechanism should be added, if applicable.

5. Projections

Table 5 ISL_BR1_v0.2

Summary of key variables and assumptions used in the projections analysis [a]

Key underlying assumptions		*Historical* [b]						Projected			
Assumption	*Unit*	*1990*	*1995*	2000	2005	2010	2011	2015	2020	2025	2030
GDP growth rate	*%*	0.58	0.76	2.64	8.07	1.56	4.67	3.00	2.70	2.60	2.30
Population	thousands	255.87	267.96	283.36	299.89	318.45	319.58	331.37	348.39	363.99	377.92
Population growth	%	0.82	0.37	1.55	2.15	0.26	0.35	1.01	0.96	0.83	0.71
International oil price	USD / boe	33.00	25.00	33.00	40.00	79.00	90.00	105.00	127.00	133.00	139.00
Gross domestic oil consumption	PJ	15.60	16.70	16.40	15.10	11.00	10.10	9.70	10.10	11.80	12.50
Gross electricity production, oil	GWh	6.00	8.00	4.00	8.00	2.00	2.00	4.00	4.00	4.00	4.00
Gross electricity production, hydropower	GWh	4,159.00	4,677.00	6,350.00	7,015.00	12,592.00	12,507.00	13,451.00	13,451.00	13,793.00	14,112.00
Gross electricity production, geothermal	GWh	283.00	290.00	1,323.00	1,658.00	4,465.00	4,701.00	5,250.00	5,800.00	6,000.00	6,100.00
Gross electricity production, other	GWh							5.00	10.00	15.00	20.00
Aluminium production	kt	87.84	100.20	226.36	272.49	818.86	806.32	854.52	865.00	865.00	865.00
Ferrosilicon production	kt	62.79	71.41	108.40	110.96	102.21	105.19	109.17	109.17	109.17	109.17
Dairy cattle	thousands	32.25	30.43	27.07	24.54	25.71	25.66	23.85	24.18	24.78	25.31
Other cattle	thousands	42.65	42.77	45.07	41.44	48.07	47.11	44.94	45.24	45.53	45.83
Sheep	thousands	862.32	720.04	729.90	711.97	749.07	742.66	726.73	726.87	727.01	727.15
Swine	thousands	29.65	31.13	32.27	38.44	40.51	43.73	47.90	52.52	56.76	60.54
Poultry	thousands	674.56	361.53	545.26	771.12	724.29	801.94	905.43	1,005.05	1,103.79	1,201.48
Horses	thousands	73.87	80.25	75.63	76.63	78.85	79.94	77.58	77.58	77.58	77.58
Fur animals	thousands	49.59	37.89	41.43	36.95	37.63	42.06	46.41	56.41	66.41	76.41
Synthetic fertilizer amount used	kt N	12.47	11.19	12.67	9.76	10.75	10.41	11.77	12.11	12.45	12.80
Manure amount	kt N	19.40	17.40	17.67	17.07	17.85	17.93	17.49	17.66	17.86	18.04
Solid waste generation amount	kg/head	1,485.99	1,494.88	1,594.19	1,504.26	1,386.23	1,276.73	1,350.37	1,450.57	1,450.57	1,450.57
Solid waste generation amount	kt	380.21	400.57	451.73	451.11	441.45	408.01	447.47	505.36	528.00	548.20
Fraction of waste disposed of in SWDS	%	89.99	78.39	75.71	61.69	32.79	34.34	21.65	19.43	17.22	15.00
Amount of waste disposed of in SWDS	kt	342.16	314.00	342.00	278.28	144.76	140.11	96.88	98.21	90.91	82.23
Solid waste amount incinerated	kt	38.06	26.47	16.10	12.16	11.17	13.21	10.34	10.78	11.19	11.55
Solid waste amount composted	kt		2.00	2.00	5.00	15.24	14.28	17.29	21.05	24.80	28.56
Solid waste amount to anaerobic digestion	kt							30.00	30.00	30.00	30.00
Afforestation area since 1990, cultivated forest	kha	0.89	6.66	14.36	23.14	30.39	32.20	36.49	41.86	47.23	52.60
Afforestation area since 1990, natural birch expansion	kha	0.41	2.48	4.55	6.62	8.69	9.11	10.76	12.83	14.90	16.97
Deforestation area, accumulation since 1990	kha				0.02	0.04	0.05	0.07	0.10	0.13	0.16
Revegetation area since 1990	*kha*	2.13	16.24	38.56	62.41	83.21	87.09	97.09	109.59	122.09	134.59

[a] Parties should include key underlying assumptions as appropriate.

[b] Parties should include historical data used to develop the greenhouse gas projections reported.

Table 6(a) ISL_BR1_v0.2

Information on updated greenhouse gas projections under a 'with measures' scenario[a]

	GHG emissions and removals[b]							GHG emission projections	
	(kt CO_2 eq)							(kt CO_2 eq)	
	Base year (1990)	1990	1995	2000	2005	2010	2011	2020	2030
Sector[d,e]									
Energy	1,157.93	1,157.93	1,287.82	1,367.94	1,226.65	968.81	906.07	855.19	1,029.74
Transport	620.77	620.77	628.43	673.77	848.93	900.34	863.69	802.48	602.53
Industry/industrial processes	878.10	878.10	553.62	984.76	941.48	1,895.93	1,804.75	1,908.96	1,913.89
Agriculture	706.45	706.45	637.23	652.88	608.30	642.84	640.68	650.38	667.04
Forestry/LULUCF	1,171.40	1,171.40	1,108.77	1,015.02	904.91	795.80	746.28	NE	NE
Waste management/waste	144.75	144.75	179.12	196.23	207.17	210.08	198.07	120.93	100.70
Other (specify)									
Gas									
CO_2 emissions including net CO_2 from LULUCF	3,261.02	3,261.02	3,350.67	3,710.62	3,674.82	4,140.42	3,991.45	NE	NE
CO_2 emissions excluding net CO_2 from LULUCF	2,160.11	2,160.11	2,318.22	2,775.92	2,852.93	3,431.81	3,332.75	3,258.52	3,241.21
CH_4 emissions including CH_4 from LULUCF	407.80	407.80	428.23	448.07	450.57	467.80	452.67	NE	NE
CH_4 emissions excluding CH_4 from LULUCF	406.20	406.20	421.91	440.26	442.77	459.47	444.34	364.24	346.50
N_2O emissions including N_2O from LULUCF	589.79	589.79	547.43	567.59	524.90	532.54	527.70	NE	NE
N_2O emissions excluding N_2O from LULUCF	520.90	520.90	477.42	495.07	449.68	453.68	448.45	461.07	467.15
HFCs	NO	NO	8.51	35.78	58.42	122.54	121.35	150.78	155.71
PFCs	419.63	419.63	58.84	127.16	26.10	145.63	63.22	100.20	100.20
SF_6	1.15	1.15	1.30	1.37	2.64	4.89	3.13	3.13	3.13
Other (specify)									
Total with LULUCF[f]	4,679.39	4,679.39	4,394.98	4,890.59	4,737.45	5,413.82	5,159.52	254.11	259.04
Total without LULUCF	3,507.99	3,507.99	3,286.20	3,875.56	3,832.54	4,618.02	4,413.24	4,337.94	4,313.90

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.

6. Provision of financial, technological and capacity-building support to developing country Parties

Table 7 ISL_BR1_v0.2

Provision of public financial support: summary information in 2011[a]

Allocation channels	*Year*									
	Icelandic króna - ISK					*USD[b]*				
	Core/ general[c]	*Climate-specific[d]*				*Core/ general[c]*	*Climate-specific[d]*			
		Mitigation	*Adaptation*	*Cross-cutting[e]*	*Other[f]*		*Mitigation*	*Adaptation*	*Cross-cutting[e]*	*Other[f]*
Total contributions through multilateral channels:	580,340,294.00		240,928,537.00	411,640,565.00		5,000,433.37		2,075,932.17	3,546,852.12	
Multilateral climate change funds[g]			16,412,789.00					141,418.85		
Other multilateral climate change funds[h]										
Multilateral financial institutions, including regional development banks	246,069,219.00			162,781,051.00		2,120,226.26			1,402,583.62	
Specialized United Nations bodies	334,271,075.00		224,515,748.00	248,859,514.00		2,880,207.11		1,934,513.32	2,144,268.50	
Total contributions through bilateral, regional and other channels		79,496,712.00	90,895,698.00	19,980,330.00			684,974.00	783,592.00	172,158.00	
Total	580,340,294.00	79,496,712.00	331,824,235.00	431,620,895.00		5,000,433.37	684,974.00	2,859,524.17	3,719,010.12	

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 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 box below.

[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.

Custom Footnotes

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).
Documentation Box: USD were calcualted using an exchange rate of 116 and 125 ISK per USD for 2011 and 2012, respectively.

Table 7 ISL_BR1_v0.2

Provision of public financial support: summary information in 2012[a]

Allocation channels	*Year*									
	Icelandic króna - ISK					*USD[b]*				
	Core/ general[c]	*Climate-specific[d]*				*Core/ general[c]*	*Climate-specific[d]*			
		Mitigation	*Adaptation*	*Cross-cutting[e]*	*Other[f]*		*Mitigation*	*Adaptation*	*Cross-cutting[e]*	*Other[f]*
Total contributions through multilateral channels:	550,225,596.00		300,614,938.00	534,130,202.00		4,397,653.37		2,402,651.41	4,269,011.65	
Multilateral climate change funds[g]			19,460,850.00					155,539.97		
Other multilateral climate change funds[h]										
Multilateral financial institutions, including regional development banks	242,166,545.00			225,693,494.00		1,935,505.24			1,803,845.10	
Specialized United Nations bodies	308,059,051.00		281,154,088.00	308,436,708.00		2,462,148.13		2,247,111.44	2,465,166.55	
Total contributions through bilateral, regional and other channels		93,107,856.00	273,366,636.00	14,139,585.00			744,160.00	2,184,871.00	113,010.00	
Total	550,225,596.00	93,107,856.00	573,981,574.00	548,269,787.00		4,397,653.37	744,160.00	4,587,522.41	4,382,021.65	

Abbreviation: USD = United States dollars.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 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 box below.

[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.

Custom Footnotes

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).
Documentation Box: USD were calcualted using an exchange rate of 116 and 125 ISK per USD for 2011 and 2012, respectively.

Provision of public financial support: contribution through multilateral channels in 2011[a]

Donor funding	*Total amount*				*Status[b]*	*Funding source[f]*	*Financial instrument[f]*	*Type of support[f, g]*	*Sector[c]*
	Core/general[d]		*Climate-specific[e]*						
	Icelandic króna - ISK	*USD*	*Icelandic króna - ISK*	*USD*					
Total contributions through multilateral channels	580,340,294.00	5,000,433.37	652,569,102.00	5,622,784.29					
Multilateral climate change funds[g]			16,412,789.00	141,418.85					
1. Global Environment Facility									
2. Least Developed Countries Fund			16,412,789.00	141,418.85	Provided	ODA	Grant	Adaptation	Cross-cutting
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
Multilateral financial institutions, including regional development banks	246,069,219.00	2,120,226.26	162,781,051.00	1,402,583.62					
1. World Bank	234,100,000.00	2,017,094.90	43,991,551.00	379,047.98	Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. International Finance Corporation									
3. African Development Bank									
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other	11,969,219.00	103,131.36	118,789,500.00	1,023,535.64					
Nordic Development Fund			64,000,000.00	551,448.41	Provided	ODA	Grant	Cross-cutting	Cross-cutting
NGOs	11,969,219.00	103,131.36	54,789,500.00	472,087.23	Provided	ODA	Grant	Cross-cutting	Cross-cutting
Specialized United Nations bodies	334,271,075.00	2,880,207.11	473,375,262.00	4,078,781.82					
1. United Nations Development Programme	22,101,489.00	190,434.86							
	22,101,489.00	190,434.86			Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. United Nations Environment Programme	9,639,964.00	83,061.61							
	9,639,964.00	83,061.61			Provided	ODA	Grant	Cross-cutting	Cross-cutting
3. Other	302,529,622.00	2,606,710.64	473,375,262.00	4,078,781.82					
United Nations	18,900,000.00	162,849.61	5,362,000.00	46,201.04	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNU Geothermal Training Programme			187,856,039.00	1,618,639.29	Provided	ODA	Grant	Cross-cutting	Energy
UNU Fisheries Training Programme			157,300,000.00	1,355,356.80	Provided	ODA	Grant	Adaptation	Agriculture
UNU Land Restoration Training Programme			50,000,000.00	430,819.07	Provided	ODA	Grant	Adaptation	Forestry
UNU Gender Equality Training Programme			38,512,975.00	331,842.48	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UN Women	58,542,650.00	504,425.80			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNICEF	76,871,500.00	662,354.17			Provided	ODA	Grant	Cross-cutting	Cross-cutting
FAO	21,934,900.00	188,999.47	17,128,500.00	147,585.69	Provided	ODA	Grant	Cross-cutting	Agriculture
IFAD	2,904,250.00	25,024.13			Provided	ODA	Grant	Cross-cutting	Agriculture
WFP			5,704,999.00	49,156.45	Provided	ODA	Grant	Adaptation	Cross-cutting
UNHCR	5,501,500.00	47,403.02	11,510,749.00	99,181.00	Provided	ODA	Grant	Adaptation	Cross-cutting
IAEA	10,713,476.00	92,311.40			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNRWA	24,587,200.00	211,852.69			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WHO	11,932,000.00	102,810.66			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNFPA	20,296,100.00	174,878.94			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNESCO	22,277,160.00	191,948.51			Provided	ODA	Grant	Cross-cutting	Cross-cutting
ILO	13,440,000.00	115,804.17			Provided	ODA	Grant	Cross-cutting	Cross-cutting
OCHA	11,201,500.00	96,516.40			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WMO	3,427,386.00	29,531.67			Provided	ODA	Grant	Cross-cutting	Cross-cutting

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[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] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

Provision of public financial support: contribution through multilateral channels in 2012[a]

Donor funding	Total amount				Status[b]	Funding source[f]	Financial instrument[f]	Type of support[f, g]	Sector[c]
	Core/general[d]		Climate-specific[e]						
	Icelandic króna - ISK	USD	Icelandic króna - ISK	USD					
Total contributions through multilateral channels	550,225,596.00	4,397,653.37	834,745,140.00	6,671,663.06					
Multilateral climate change funds[g]			19,460,850.00	155,539.97					
1. Global Environment Facility									
2. Least Developed Countries Fund			19,460,850.00	155,539.97	Provided	ODA	Grant	Adaptation	Cross-cutting
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
Multilateral financial institutions, including regional development banks	242,166,545.00	1,935,505.24	225,693,494.00	1,803,845.10					
1. World Bank	204,020,000.00	1,630,620.69	100,946,030.00	806,806.61	Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. International Finance Corporation									
3. African Development Bank									
4. Asian Development Bank									
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other	38,146,545.00	304,884.55	124,747,464.00	997,038.49					
Nordic Development Fund			41,587,950.00	332,389.82	Provided	ODA	Grant	Cross-cutting	Cross-cutting
NGOs	14,214,591.00	113,609.48	43,782,800.00	349,932.06	Provided	ODA	Grant	Cross-cutting	Cross-cutting
IRENA			38,711,700.00	309,401.52	Provided	ODA	Grant	Cross-cutting	Energy
Other multilateral	23,931,954.00	191,275.07	665,014.00	5,315.09	Provided	ODA	Grant	Cross-cutting	Cross-cutting
Specialized United Nations bodies	308,059,051.00	2,462,148.13	589,590,796.00	4,712,277.99					
1. United Nations Development Programme	24,184,292.00	193,291.87							
	24,184,292.00	193,291.87			Provided	ODA	Grant	Cross-cutting	Cross-cutting
2. United Nations Environment Programme	9,838,746.00	78,635.74							
	9,838,746.00	78,635.74			Provided	ODA	Grant	Cross-cutting	Cross-cutting
3. Other	274,036,013.00	2,190,220.52	589,590,796.00	4,712,277.99					
United Nations	19,128,623.00	152,884.66	2,302,998.00	18,406.61	Provided	ODA	Grant	Adaptation	Cross-cutting
UNU Geothermal Training Programme			243,158,671.00	1,943,434.77	Provided	ODA	Grant	Cross-cutting	Energy
UNU Fisheries Training Programme			155,400,000.00	1,242,027.53	Provided	ODA	Grant	Adaptation	Agriculture
UNU Land Restoration Training Programme			69,600,000.00	556,274.88	Provided	ODA	Grant	Adaptation	Forestry
UNU Gender Equality Training Programme			45,151,050.00	360,867.74	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UN Women	76,216,650.00	609,158.15	18,840,000.00	150,577.85	Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNICEF	69,751,500.00	557,485.73			Provided	ODA	Grant	Cross-cutting	Cross-cutting
FAO	13,503,007.00	107,922.18	1,286,987.00	10,286.19	Provided	ODA	Grant	Cross-cutting	Agriculture
IFAD	3,142,000.00	25,112.29			Provided	ODA	Grant	Cross-cutting	Agriculture
WFP			23,905,264.00	191,061.75	Provided	ODA	Grant	Adaptation	Cross-cutting
UNHCR					Provided	ODA	Grant	Cross-cutting	Cross-cutting
IAEA	12,526,668.00	100,118.83			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNRWA	11,401,500.00	91,125.98			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WHO	11,400,000.00	91,113.99			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNFPA	9,001,500.00	71,944.08			Provided	ODA	Grant	Cross-cutting	Cross-cutting
UNESCO	11,154,105.00	89,148.68			Provided	ODA	Grant	Cross-cutting	Cross-cutting
ILO	13,440,000.00	107,418.60			Provided	ODA	Grant	Cross-cutting	Cross-cutting
OCHA	10,227,600.00	81,743.63	29,945,826.00	239,340.67	Provided	ODA	Grant	Adaptation	Cross-cutting
UNFCCC	9,542,431.00	76,267.45			Provided	ODA	Grant	Cross-cutting	Cross-cutting
WMO	3,600,429.00	28,776.27			Provided	ODA	Grant	Cross-cutting	Cross-cutting

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] Parties should fill in a separate table for each year, namely 2011 and 2012, where 2014 is the reporting year.

[b] Parties should explain, in their biennial reports, the methodologies used to specify the funds as provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[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] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

Table 7(b) ISL_BR1_v0.2

Provision of public financial support: contribution through bilateral, regional and other channels in 2011 [a]

Recipient country/ region/project/programme [b]	*Total amount*		*Status* [c]	*Funding source* [g]	*Financial instrument* [g]	*Type of support* [g, h]	*Sector* [d]	*Additional information* [e]
	Climate-specific [f]							
	Icelandic króna - ISK	*USD*						
Total contributions through bilateral, regional and other channels	190,372,740.00	1,640,724.00						
Malawi /	25,548,776.00	220,138.00	Provided	ODA	Grant	Adaptation	Water and sanitation	
Mozambique /	7,224,611.00	62,650.00	Provided	ODA	Grant	Adaptation	Water and sanitation	
Namibia /	58,122,311.00	500,804.00	Provided	ODA	Grant	Adaptation	Cross-cutting	
Nicaragua /	79,496,712.00	684,974.00	Provided	ODA	Grant	Mitigation	Energy	
Uganda /	3,190,865.00	27,494.00	Provided	ODA	Grant	Cross-cutting	Cross-cutting	
Other /	16,789,465.00	144,664.00	Provided	ODA	Grant	Cross-cutting	Cross-cutting	

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 2011 and 2012, where 2014 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 provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[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] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

Table 7(b) ISL_BR1_v0.2

Provision of public financial support: contribution through bilateral, regional and other channels in 2012 [a]

Recipient country/ region/project/programme [b]	*Total amount*		*Status* [c]	*Funding source* [g]	*Financial instrument* [g]	*Type of support* [g, h]	*Sector* [d]	*Additional information* [e]
	Climate-specific [f]							
	Icelandic króna - ISK	*USD*						
Total contributions through bilateral, regional and other channels	380,614,077.00	3,042,041.00						
Malawi /	68,184,789.00	544,964.00	Provided	ODA	Grant	Adaptation	Water and sanitation	
Mozambique /	205,181,847.00	1,639,907.00	Provided	ODA	Grant	Adaptation	Agriculture	
Nicaragua /	69,512,724.00	555,577.00	Provided	ODA	Grant	Mitigation	Energy	
Uganda /	14,139,585.00	113,010.00	Provided	ODA	Grant	Cross-cutting	Cross-cutting	
Other /	23,595,132.00	188,583.00	Provided	ODA	Grant	Mitigation	Energy	

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 2011 and 2012, where 2014 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 provided, committed and/or pledged. Parties will provide the information for as many status categories as appropriate in the following order of priority: provided, committed, pledged.

[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] Cross-cutting type of support refers to funding for activities which are cross-cutting across mitigation and adaptation.

Table 8 ISL_BR1_v0.2

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]

[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 ISL_BR1_v0.2

Provision of capacity-building support[a]

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*[b,c]

[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 2 Greenhouse gas inventories 1990-2011

1990

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1990
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,261.02**	**407.80**	**589.79**	**NA,NE,NO**	**419.63**	**1.15**	**4,679.39**
1. Energy	**1,746.49**	**5.35**	**26.86**				**1,778.70**
A. Fuel Combustion (Sectoral Approach)	1,685.13	4.67	26.86				1,716.66
1. Energy Industries	13.64	0.01	0.02				13.67
2. Manufacturing Industries and Construction	360.79	0.25	15.91				376.96
3. Transport	612.37	3.08	5.32				620.77
4. Other Sectors	698.33	1.33	5.61				705.27
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	61.36	0.68	NA,NO				62.04
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	61.36	0.68	NA,NO				62.04
2. Industrial Processes	**399.28**	**0.61**	**48.36**	**NA,NE,NO**	**419.63**	**1.15**	**869.03**
A. Mineral Products	52.28	NE,NO	NE,NO				52.28
B. Chemical Industry	0.36	NE,NO	48.36	NA	NA	NA	48.72
C. Metal Production	346.63	0.61	NA	NA,NE,NO	419.63	NA,NO	766.88
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				NA,NO	NA,NO	1.15	1.15
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.07**		**6.00**				**9.07**
4. Agriculture		**274.38**	**432.07**				**706.45**
A. Enteric Fermentation		243.90					243.90
B. Manure Management		30.48	52.04				82.51
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	380.03				380.03
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**1,100.91**	**1.60**	**68.89**				**1,171.40**
A. Forest Land	-44.24	NE,NO	0.31				-43.93
B. Cropland	1,198.36	NE,NO	IE,NA,NE,NO				1,198.36
C. Grassland	-55.06	NE,NO	NE,NO				-55.06
D. Wetlands	1.86	1.60	NA,NO				3.46
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	68.58				68.58
6. Waste	**11.27**	**125.86**	**7.61**				**144.75**
A. Solid Waste Disposal on Land	NA,NE	119.25					119.25
B. Waste-water Handling		1.41	6.23				7.64
C. Waste Incineration	11.27	5.19	1.39				17.86
D. Other	NA	NO	NO				NA,NO
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	318.65	0.23	2.76				321.64
Aviation	219.65	0.03	1.92				221.61
Marine	99.00	0.20	0.84				100.03
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,507.99
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,679.39

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1991

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1991
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,186.77**	**409.50**	**570.80**	**NA,NE,NO**	**348.34**	**1.30**	**4,516.71**
1. Energy	**1,710.48**	**5.40**	**26.31**				**1,742.20**
A. Fuel Combustion (Sectoral Approach)	1,640.53	4.80	26.31				1,671.65
1. Energy Industries	15.22	0.01	0.02				15.25
2. Manufacturing Industries and Construction	285.34	0.21	15.07				300.62
3. Transport	624.15	3.22	5.47				632.83
4. Other Sectors	715.83	1.36	5.75				722.95
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	69.95	0.60	NA,NO				70.55
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	69.95	0.60	NA,NO				70.55
2. Industrial Processes	**365.29**	**0.51**	**46.81**	**NA,NE,NO**	**348.34**	**1.30**	**762.25**
A. Mineral Products	48.65	NE,NO	NE,NO				48.65
B. Chemical Industry	0.31	NE,NO	46.81	NA	NA	NA	47.12
C. Metal Production	316.32	0.51	NA	NA,NE,NO	348.34	NA,NO	665.17
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				NA,NO	NA,NO	1.30	1.30
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.20**		**5.43**				**8.63**
4. Agriculture		**266.72**	**415.44**				**682.15**
A. Enteric Fermentation		236.58					236.58
B. Manure Management		30.13	48.33				78.46
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils[(3)]		NA,NE,NO	367.11				367.11
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry[(1)]	**1,096.61**	**6.31**	**69.11**				**1,172.04**
A. Forest Land	-46.01	NE,NO	0.37				-45.64
B. Cropland	1,193.22	NE,NO	IE,NA,NE,NO				1,193.22
C. Grassland	-57.96	NE,NO	NE,NO				-57.96
D. Wetlands	7.36	6.31	NA,NO				13.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	68.74				68.74
6. Waste	**11.18**	**130.56**	**7.70**				**149.44**
A. Solid Waste Disposal on Land	NA,NE	123.25					123.25
B. Waste-water Handling		2.15	6.32				8.47
C. Waste Incineration	11.18	5.16	1.38				17.72
D. Other	NA	NO	NO				NA,NO
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	259.64	0.11	2.26				262.01
Aviation	221.99	0.03	1.94				223.96
Marine	37.65	0.08	0.32				38.05
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,344.68
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,516.71

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1992

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1992
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) (1)	**3,297.15**	**413.65**	**539.86**	**NA,NE,NO**	**155.28**	**1.30**	**4,407.24**
1. Energy	**1,833.72**	**5.67**	**26.03**				**1,865.42**
A. Fuel Combustion (Sectoral Approach)	1,766.11	5.03	26.03				1,797.17
1. Energy Industries	13.67	0.01	0.02				13.70
2. Manufacturing Industries and Construction	339.15	0.24	14.15				353.54
3. Transport	634.57	3.30	5.57				643.44
4. Other Sectors	778.72	1.49	6.29				786.49
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	67.62	0.63	NA,NO				68.25
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	67.62	0.63	NA,NO				68.25
2. Industrial Processes	**368.30**	**0.53**	**41.85**	**NA,NE,NO**	**155.28**	**1.30**	**567.26**
A. Mineral Products	45.69	NE,NO	NE,NO				45.69
B. Chemical Industry	0.25	NE,NO	41.85	NA	NA	NA	42.10
C. Metal Production	322.36	0.53	NA	NA,NE,NO	155.28	NA,NO	478.16
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 (2)				NA,NO	NA,NO	1.30	1.30
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.20**		**4.82**				**8.02**
4. Agriculture		**260.82**	**390.06**				**650.88**
A. Enteric Fermentation		231.92					231.92
B. Manure Management		28.90	43.06				71.96
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils(3)		NA,NE,NO	347.00				347.00
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry(1)	**1,081.04**	**6.31**	**69.36**				**1,156.72**
A. Forest Land	-51.10	NE,NO	0.45				-50.66
B. Cropland	1,187.35	NE,NO	IE,NA,NE,NO				1,187.35
C. Grassland	-62.57	NE,NO	NE,NO				-62.57
D. Wetlands	7.36	6.31	NA,NO				13.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	68.91				68.91
6. Waste	**10.88**	**140.33**	**7.74**				**158.95**
A. Solid Waste Disposal on Land	NA,NE	133.12					133.12
B. Waste-water Handling		2.17	6.39				8.56
C. Waste Incineration	10.88	5.03	1.35				17.26
D. Other	NA	NO	NO				NA,NO
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: (4)							
International Bunkers	263.56	0.15	2.29				266.00
Aviation	203.62	0.03	1.78				205.43
Marine	59.95	0.12	0.51				60.57
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,250.52
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,407.24

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1993

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1993
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,406.97**	**421.70**	**550.70**	**0.67**	**74.86**	**1.30**	**4,456.21**
1. Energy	**1,910.14**	**5.76**	**27.52**				**1,943.42**
A. Fuel Combustion (Sectoral Approach)	1,824.76	5.11	27.52				1,857.40
1. Energy Industries	14.87	0.02	0.09				14.98
2. Manufacturing Industries and Construction	366.43	0.26	15.28				381.96
3. Transport	635.04	3.28	5.60				643.91
4. Other Sectors	808.43	1.56	6.55				816.54
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	85.38	0.65	NA,NO				86.02
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	85.38	0.65	NA,NO				86.02
2. Industrial Processes	**416.72**	**0.60**	**44.02**	**0.67**	**74.86**	**1.30**	**538.18**
A. Mineral Products	39.68	NE,NO	NE,NO				39.68
B. Chemical Industry	0.24	NE,NO	44.02	NA	NA	NA	44.26
C. Metal Production	376.80	0.60	NA	NA,NE,NO	74.86	NA,NO	452.26
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				0.67	NA,NO	1.30	1.98
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.21**		**4.74**				**7.96**
4. Agriculture		**260.75**	**397.25**				**658.00**
A. Enteric Fermentation		231.97					231.97
B. Manure Management		28.79	43.74				72.53
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	353.51				353.51
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**1,067.63**	**6.31**	**69.54**				**1,143.49**
A. Forest Land	-56.33	NE,NO	0.46				-55.87
B. Cropland	1,181.43	NE,NO	IE,NA,NE,NO				1,181.43
C. Grassland	-64.82	NE,NO	NE,NO				-64.82
D. Wetlands	7.36	6.31	NA,NO				13.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	69.08				69.08
6. Waste	**9.27**	**148.27**	**7.63**				**165.17**
A. Solid Waste Disposal on Land	NA,NE	141.72					141.72
B. Waste-water Handling		2.19	6.46				8.66
C. Waste Incineration	9.27	4.36	1.17				14.80
D. Other	NA	NO	NO				NA,NO
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	293.02	0.22	2.54				295.78
Aviation	195.64	0.03	1.71				197.38
Marine	97.38	0.19	0.82				98.40
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,312.72
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,456.21

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1994

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1994
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) (1)	**3,341.33**	**430.39**	**556.88**	**1.41**	**44.57**	**1.30**	**4,375.89**
1. Energy	**1,857.28**	**5.75**	**27.69**				**1,890.72**
A. Fuel Combustion (Sectoral Approach)	1,787.16	5.10	27.69				1,819.94
1. Energy Industries	14.54	0.02	0.09				14.65
2. Manufacturing Industries and Construction	343.79	0.25	15.50				359.54
3. Transport	637.79	3.31	5.65				646.75
4. Other Sectors	791.04	1.52	6.45				799.00
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	70.12	0.66	NA,NO				70.78
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	70.12	0.66	NA,NO				70.78
2. Industrial Processes	**417.92**	**0.57**	**44.33**	**1.41**	**44.57**	**1.30**	**510.10**
A. Mineral Products	37.37	NE,NO	NE,NO				37.37
B. Chemical Industry	0.35	NE,NO	44.33	NA	NA	NA	44.68
C. Metal Production	380.20	0.57	NA	NA,NE,NO	44.57	NA,NO	425.34
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 (2)				1.41	NA,NO	1.30	2.71
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.20**		**4.29**				**7.49**
4. Agriculture		**261.77**	**403.27**				**665.04**
A. Enteric Fermentation		233.27					233.27
B. Manure Management		28.50	43.78				72.28
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils (3)		NA,NE,NO	359.49				359.49
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry (1)	**1,054.39**	**6.31**	**69.72**				**1,130.42**
A. Forest Land	-59.22	NE,NO	0.47				-58.75
B. Cropland	1,175.47	NE,NO	IE,NA,NE,NO				1,175.47
C. Grassland	-69.22	NE,NO	NE,NO				-69.22
D. Wetlands	7.36	6.31	NA,NO				13.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	69.24				69.24
6. Waste	**8.54**	**155.99**	**7.59**				**172.11**
A. Solid Waste Disposal on Land	NA,NE	149.73					149.73
B. Waste-water Handling		2.21	6.50				8.71
C. Waste Incineration	8.54	4.05	1.08				13.67
D. Other	NA	NO	NO				NA,NO
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: (4)							
International Bunkers	307.10	0.22	2.66				309.98
Aviation	213.62	0.03	1.87				215.52
Marine	93.49	0.19	0.79				94.46
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,245.47
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,375.89

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1995

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1995
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs [2]	PFCs [2]	SF_6 [2]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**3,350.67**	**428.23**	**547.43**	**8.51**	**58.84**	**1.30**	**4,394.99**
1. Energy	**1,872.78**	**5.32**	**38.15**				**1,916.25**
A. Fuel Combustion (Sectoral Approach)	1,790.55	4.58	38.15				1,833.28
1. Energy Industries	18.89	0.03	0.12				19.04
2. Manufacturing Industries and Construction	358.10	0.27	19.29				377.67
3. Transport	613.50	2.73	12.20				628.43
4. Other Sectors	800.06	1.54	6.54				808.14
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	82.23	0.74	NA,NO				82.97
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	82.23	0.74	NA,NO				82.97
2. Industrial Processes	**434.70**	**0.59**	**42.16**	**8.51**	**58.84**	**1.30**	**546.11**
A. Mineral Products	37.87	NE,NO	NE,NO				37.87
B. Chemical Industry	0.46	NE,NO	42.16	NA	NA	NA	42.62
C. Metal Production	396.37	0.59	NA	NA,NE,NO	58.84	NA,NO	455.81
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [2]				8.51	NA,NO	1.30	9.82
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.21**		**4.29**				**7.51**
4. Agriculture		**252.12**	**385.11**				**637.23**
A. Enteric Fermentation		224.14					224.14
B. Manure Management		27.98	41.02				69.00
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [3]		NA,NE,NO	344.09				344.09
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [1]	**1,032.44**	**6.31**	**70.01**				**1,108.77**
A. Forest Land	-69.33	NE,NO	0.52				-68.81
B. Cropland	1,169.54	NE,NO	IE,NA,NE,NO				1,169.54
C. Grassland	-75.12	NE,NO	NE,NO				-75.12
D. Wetlands	7.36	6.31	NA,NO				13.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	69.49				69.49
6. Waste	**7.53**	**163.88**	**7.71**				**179.12**
A. Solid Waste Disposal on Land	NA,NE	157.88					157.88
B. Waste-water Handling		2.22	6.56				8.77
C. Waste Incineration	7.53	3.61	0.97				12.11
D. Other	NA	0.17	0.19				0.35
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [4]							
International Bunkers	380.15	0.32	3.28				383.76
Aviation	236.15	0.04	2.07				238.25
Marine	144.00	0.29	1.21				145.50
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,286.22
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,394.99

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1996

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1996
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,425.98**	**436.58**	**568.39**	**15.31**	**25.15**	**1.30**	**4,472.72**
1. Energy	**1,963.14**	**5.46**	**38.08**				**2,006.67**
A. Fuel Combustion (Sectoral Approach)	1,881.87	4.75	38.08				1,924.70
1. Energy Industries	11.62	0.03	0.13				11.78
2. Manufacturing Industries and Construction	399.02	0.30	18.78				418.10
3. Transport	604.42	2.76	12.11				619.29
4. Other Sectors	866.82	1.66	7.06				875.54
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	81.27	0.70	NA,NO				81.97
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	81.27	0.70	NA,NO				81.97
2. Industrial Processes	**434.07**	**0.57**	**49.29**	**15.31**	**25.15**	**1.30**	**525.70**
A. Mineral Products	41.78	NE,NO	NE,NO				41.78
B. Chemical Industry	0.40	NE,NO	49.29	NA	NA	NA	49.69
C. Metal Production	391.89	0.57	NA	NA,NE,NO	25.15	NA,NO	417.61
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				15.31	NA,NO	1.30	16.61
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.45**		**4.71**				**8.16**
4. Agriculture		**255.88**	**398.39**				**654.28**
A. Enteric Fermentation		227.36					227.36
B. Manure Management		28.52	42.01				70.53
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	356.38				356.38
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**1,018.57**	**7.70**	**70.25**				**1,096.51**
A. Forest Land	-74.12	NE,NO	0.54				-73.58
B. Cropland	1,163.64	NE,NO	IE,NA,NE,NO				1,163.64
C. Grassland	-79.93	NE,NO	NE,NO				-79.93
D. Wetlands	8.98	7.70	NA,NO				16.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	69.71				69.71
6. Waste	**6.75**	**166.97**	**7.67**				**181.39**
A. Solid Waste Disposal on Land	NA,NE	161.30					161.30
B. Waste-water Handling		2.23	6.61				8.84
C. Waste Incineration	6.75	3.27	0.88				10.89
D. Other	NA	0.17	0.19				0.35
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	395.45	0.29	3.42				399.17
Aviation	271.51	0.04	2.38				273.93
Marine	123.95	0.25	1.04				125.24
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,376.20
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,472.72

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1997

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1997
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,495.43**	**437.78**	**567.87**	**23.72**	**82.36**	**1.30**	**4,608.46**
1. Energy	**1,992.27**	**5.16**	**48.99**				**2,046.42**
A. Fuel Combustion (Sectoral Approach)	1,928.42	4.27	48.99				1,981.67
1. Energy Industries	8.17	0.03	0.12				8.33
2. Manufacturing Industries and Construction	467.37	0.35	22.64				490.36
3. Transport	615.75	2.26	19.35				637.36
4. Other Sectors	837.12	1.62	6.88				845.62
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	63.85	0.89	NA,NO				64.74
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	63.85	0.89	NA,NO				64.74
2. Industrial Processes	**493.42**	**0.60**	**41.11**	**23.72**	**82.36**	**1.30**	**642.52**
A. Mineral Products	46.55	NE,NO	NE,NO				46.55
B. Chemical Industry	0.44	NE,NO	41.11	NA	NA	NA	41.54
C. Metal Production	446.44	0.60	NA	NA,NE,NO	82.36	NA,NO	529.40
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				23.72	NA,NO	1.30	25.03
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.55**		**4.71**				**8.26**
4. Agriculture		**254.07**	**394.76**				**648.83**
A. Enteric Fermentation		225.83					225.83
B. Manure Management		28.23	42.64				70.88
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils[(3)]		NA,NE,NO	352.12				352.12
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry[(1)]	**999.68**	**7.70**	**70.62**				**1,078.00**
A. Forest Land	-81.51	NE,NO	0.57				-80.94
B. Cropland	1,157.66	NE,NO	IE,NA,NE,NO				1,157.66
C. Grassland	-85.45	NE,NO	NE,NO				-85.45
D. Wetlands	8.98	7.70	NA,NO				16.67
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	70.05				70.05
6. Waste	**6.50**	**170.25**	**7.69**				**184.44**
A. Solid Waste Disposal on Land	NA,NE	164.70					164.70
B. Waste-water Handling		2.25	6.66				8.91
C. Waste Incineration	6.50	3.13	0.84				10.47
D. Other	NA	0.17	0.19				0.35
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	440.80	0.34	3.81				444.95
Aviation	292.12	0.04	2.56				294.72
Marine	148.68	0.30	1.25				150.23
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,530.46
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,608.46

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1998

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1998
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,483.15**	**447.86**	**570.22**	**35.72**	**180.13**	**1.30**	**4,718.40**
1. Energy	**1,974.38**	**5.34**	**49.50**				**2,029.21**
A. Fuel Combustion (Sectoral Approach)	1,890.68	4.24	49.50				1,944.41
1. Energy Industries	11.11	0.03	0.13				11.27
2. Manufacturing Industries and Construction	444.57	0.33	22.88				467.79
3. Transport	619.00	2.30	19.83				641.13
4. Other Sectors	815.99	1.57	6.66				824.22
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	83.70	1.10	NA,NO				84.80
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	83.70	1.10	NA,NO				84.80
2. Industrial Processes	**521.32**	**0.44**	**35.84**	**35.72**	**180.13**	**1.30**	**774.75**
A. Mineral Products	54.39	NE,NO	NE,NO				54.39
B. Chemical Industry	0.40	NE,NO	35.84	NA	NA	NA	36.23
C. Metal Production	466.53	0.44	NA	NA,NE,NO	180.13	NA,NO	647.11
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				35.72	NA,NO	1.30	37.03
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.80**		**4.84**				**8.63**
4. Agriculture		**259.53**	**401.25**				**660.79**
A. Enteric Fermentation		230.38					230.38
B. Manure Management		29.16	43.63				72.78
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	357.63				357.63
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**978.15**	**7.80**	**71.16**				**1,057.11**
A. Forest Land	-89.67	NE,NO	0.64				-89.03
B. Cropland	1,151.70	NE,NO	IE,NA,NE,NO				1,151.70
C. Grassland	-92.98	NE,NO	NE,NO				-92.98
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	70.51				70.51
6. Waste	**5.51**	**174.74**	**7.65**				**187.90**
A. Solid Waste Disposal on Land	NA,NE	169.61					169.61
B. Waste-water Handling		2.28	6.74				9.02
C. Waste Incineration	5.51	2.69	0.72				8.93
D. Other	NA	0.17	0.19				0.35
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	514.67	0.40	4.44				519.51
Aviation	338.13	0.05	2.96				341.14
Marine	176.54	0.35	1.48				178.37
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,661.29
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,718.40

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

1999

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Inventory 1999

(Sheet 1 of 1) Submission 2013 v1.1

ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,668.11**	**452.90**	**592.42**	**40.45**	**173.21**	**1.30**	**4,928.40**
1. Energy	**2,031.73**	**5.18**	**61.20**				**2,098.11**
A. Fuel Combustion (Sectoral Approach)	1,920.46	3.60	61.20				1,985.26
1. Energy Industries	8.24	0.03	0.12				8.40
2. Manufacturing Industries and Construction	470.11	0.36	25.04				495.50
3. Transport	640.69	1.67	29.49				671.84
4. Other Sectors	801.42	1.54	6.55				809.51
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	111.27	1.58	NA,NO				112.86
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	111.27	1.58	NA,NO				112.86
2. Industrial Processes	**670.41**	**0.68**	**36.18**	**40.45**	**173.21**	**1.30**	**922.23**
A. Mineral Products	61.46	NE,NO	NE,NO				61.46
B. Chemical Industry	0.43	NE,NO	36.18	NA	NA	NA	36.61
C. Metal Production	608.52	0.68	NA	NA,NE,NO	173.21	NA,NO	782.41
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				40.45	NA,NO	1.30	41.75
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.47**		**4.82**				**8.29**
4. Agriculture		**259.52**	**410.92**				**670.44**
A. Enteric Fermentation		230.26					230.26
B. Manure Management		29.26	43.74				73.00
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils[(3)]		NA,NE,NO	367.18				367.18
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry[(1)]	**957.99**	**7.80**	**71.68**				**1,037.48**
A. Forest Land	-95.55	NE,NO	0.67				-94.88
B. Cropland	1,145.63	NE,NO	IE,NA,NE,NO				1,145.63
C. Grassland	-101.19	NE,NO	NE,NO				-101.19
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	71.01				71.01
6. Waste	**4.51**	**179.72**	**7.62**				**191.85**
A. Solid Waste Disposal on Land	NA,NE	174.99					174.99
B. Waste-water Handling		2.31	6.83				9.14
C. Waste Incineration	4.51	2.25	0.61				7.36
D. Other	NA	0.17	0.19				0.35
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	527.25	0.38	4.57				532.20
Aviation	363.37	0.05	3.18				366.61
Marine	163.88	0.33	1.38				165.59
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,890.92
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,928.40

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2000

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2000
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,710.62**	**448.07**	**567.59**	**35.78**	**127.16**	**1.37**	**4,890.60**
1. Energy	**1,975.42**	**5.24**	**61.05**				**2,041.71**
A. Fuel Combustion (Sectoral Approach)	1,822.28	3.47	61.05				1,886.79
1. Energy Industries	7.24	0.03	0.12				7.40
2. Manufacturing Industries and Construction	423.71	0.33	25.49				449.53
3. Transport	642.83	1.65	29.29				673.77
4. Other Sectors	748.50	1.45	6.14				756.09
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	153.15	1.77	NA,NO				154.92
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	153.15	1.77	NA,NO				154.92
2. Industrial Processes	**792.55**	**0.94**	**18.63**	**35.78**	**127.16**	**1.37**	**976.45**
A. Mineral Products	65.68	NE,NO	NE,NO				65.68
B. Chemical Industry	0.41	NE,NO	18.63	NA	NA	NA	19.04
C. Metal Production	726.46	0.94	NA	NA,NE,NO	127.16	NA,NO	854.57
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				35.78	NA,NO	1.37	37.16
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.71**		**4.60**				**8.31**
4. Agriculture		**249.78**	**403.09**				**652.88**
A. Enteric Fermentation		221.33					221.33
B. Manure Management		28.45	43.13				71.58
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils[(3)]		NA,NE,NO	359.96				359.96
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry[(1)]	**934.70**	**7.80**	**72.52**				**1,015.02**
A. Forest Land	-107.07	NE,NO	0.86				-106.21
B. Cropland	1,139.59	NE,NO	IE,NA,NE,NO				1,139.59
C. Grassland	-106.93	NE,NO	NE,NO				-106.93
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	71.65				71.65
6. Waste	**4.24**	**184.30**	**7.70**				**196.23**
A. Solid Waste Disposal on Land	NA,NE	179.59					179.59
B. Waste-water Handling		2.34	6.92				9.26
C. Waste Incineration	4.24	2.20	0.59				7.03
D. Other	NA	0.17	0.19				0.35
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	626.29	0.50	5.41				632.20
Aviation	407.74	0.06	3.57				411.37
Marine	218.55	0.44	1.84				220.82
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,875.58
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,890.60

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2001

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2001
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,693.34**	**456.48**	**560.22**	**40.27**	**91.66**	**1.37**	**4,843.34**
1. Energy	**1,939.14**	**5.19**	**60.23**				**2,004.55**
A. Fuel Combustion (Sectoral Approach)	1,795.37	3.35	60.23				1,858.95
1. Energy Industries	6.55	0.03	0.12				6.71
2. Manufacturing Industries and Construction	470.93	0.35	25.08				496.36
3. Transport	653.53	1.68	29.58				684.79
4. Other Sectors	664.36	1.28	5.45				671.09
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	143.77	1.84	NA,NO				145.61
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	143.77	1.84	NA,NO				145.61
2. Industrial Processes	**826.74**	**0.91**	**16.15**	**40.27**	**91.66**	**1.37**	**977.11**
A. Mineral Products	58.99	NE,NO	NE,NO				58.99
B. Chemical Industry	0.49	NE,NO	16.15	NA	NA	NA	16.64
C. Metal Production	767.26	0.91	NA	NA,NE,NO	91.66	NA,NO	859.82
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				40.27	0.01	1.37	41.66
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.37**		**4.28**				**7.65**
4. Agriculture		**252.03**	**398.82**				**650.84**
A. Enteric Fermentation		223.06					223.06
B. Manure Management		28.96	41.67				70.63
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	357.14				357.14
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**920.06**	**7.80**	**73.01**				**1,000.87**
A. Forest Land	-112.80	NE,NO	0.89				-111.91
B. Cropland	1,133.44	NE,NO	IE,NA,NE,NO				1,133.44
C. Grassland	-109.69	NE,NO	NE,NO				-109.69
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	72.12				72.12
6. Waste	**4.03**	**190.55**	**7.73**				**202.32**
A. Solid Waste Disposal on Land	NA,NE	186.02					186.02
B. Waste-water Handling		2.37	7.01				9.38
C. Waste Incineration	4.03	1.99	0.54				6.57
D. Other	NA	0.17	0.19				0.35
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	498.17	0.35	4.32				502.83
Aviation	349.13	0.05	3.06				352.24
Marine	149.04	0.30	1.26				150.60
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,842.47
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,843.34

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2002

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2002
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,765.44**	**454.40**	**528.05**	**38.10**	**72.54**	**1.37**	**4,859.90**
1. Energy	**2,014.81**	**5.34**	**59.54**				**2,079.69**
A. Fuel Combustion (Sectoral Approach)	1,867.25	3.50	59.54				1,930.29
1. Energy Industries	8.52	0.04	0.12				8.68
2. Manufacturing Industries and Construction	473.73	0.35	23.52				497.60
3. Transport	657.22	1.69	29.89				688.80
4. Other Sectors	727.78	1.42	6.01				735.20
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	147.57	1.84	NA,NO				149.41
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	147.57	1.84	NA,NO				149.41
2. Industrial Processes	**840.90**	**0.97**	**NA,NE,NO**	**38.10**	**72.54**	**1.37**	**953.89**
A. Mineral Products	39.76	NE,NO	NE,NO				39.76
B. Chemical Industry	0.45	NE,NO	NE,NO	NA	NA	NA	0.45
C. Metal Production	800.68	0.97	NA	NA,NE,NO	72.54	NA,NO	874.19
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				38.10	0.01	1.37	39.48
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.39**		**4.03**				**7.42**
4. Agriculture		**246.26**	**383.02**				**629.28**
A. Enteric Fermentation		218.32					218.32
B. Manure Management		27.93	41.75				69.68
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	341.27				341.27
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**902.58**	**7.80**	**73.71**				**984.09**
A. Forest Land	-120.89	NE,NO	0.96				-119.94
B. Cropland	1,127.26	NE,NO	IE,NA,NE,NO				1,127.26
C. Grassland	-112.90	NE,NO	NE,NO				-112.90
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	72.75				72.75
6. Waste	**3.75**	**194.03**	**7.75**				**205.53**
A. Solid Waste Disposal on Land	NA,NE	187.62					187.62
B. Waste-water Handling		4.37	7.06				11.43
C. Waste Incineration	3.75	1.86	0.50				6.12
D. Other	NA	0.17	0.19				0.35
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	517.17	0.46	4.46				522.10
Aviation	309.85	0.05	2.71				312.61
Marine	207.32	0.41	1.75				209.49
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,875.81
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,859.90

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2003

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS

(Sheet 1 of 1)

Inventory 2003
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) (1)	**3,734.68**	**453.09**	**518.17**	**47.19**	**59.79**	**1.37**	**4,814.29**
1. Energy	**2,007.69**	**5.31**	**58.78**				**2,071.78**
A. Fuel Combustion (Sectoral Approach)	1,871.18	3.52	58.78				1,933.48
1. Energy Industries	7.79	0.03	0.12				7.95
2. Manufacturing Industries and Construction	425.39	0.33	21.51				447.23
3. Transport	751.18	1.81	31.44				784.43
4. Other Sectors	686.82	1.35	5.70				693.88
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	136.51	1.79	NA,NO				138.30
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	136.51	1.79	NA,NO				138.30
2. Industrial Processes	**840.36**	**0.94**	**NA,NE,NO**	**47.19**	**59.79**	**1.37**	**949.65**
A. Mineral Products	33.48	NE,NO	NE,NO				33.48
B. Chemical Industry	0.48	NE,NO	NE,NO	NA	NA	NA	0.48
C. Metal Production	806.41	0.94	NA	NA,NE,NO	59.78	NA,NO	867.13
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 (2)				47.19	0.00	1.37	48.57
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.33**		**3.88**				**7.21**
4. Agriculture		**243.63**	**373.54**				**617.17**
A. Enteric Fermentation		216.13					216.13
B. Manure Management		27.50	41.42				68.92
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils (3)		NA,NE,NO	332.12				332.12
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry (1)	**880.07**	**7.80**	**74.15**				**962.02**
A. Forest Land	-131.98	NE,NO	0.98				-131.00
B. Cropland	1,123.44	NE,NO	IE,NA,NE,NO				1,123.44
C. Grassland	-120.49	NE,NO	NE,NO				-120.49
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	NE,NO	NE	NE				NE,NO
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	73.17				73.17
6. Waste	**3.22**	**195.41**	**7.83**				**206.46**
A. Solid Waste Disposal on Land	NA,NE	189.13					189.13
B. Waste-water Handling		4.41	7.11				11.52
C. Waste Incineration	3.22	1.62	0.44				5.28
D. Other	NA	0.25	0.28				0.53
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: (4)							
International Bunkers	476.72	0.34	4.13				481.19
Aviation	333.00	0.05	2.92				335.97
Marine	143.72	0.29	1.21				145.22
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,852.26
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,814.29

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2004

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Inventory 2004

(Sheet 1 of 1) Submission 2013 v1.1

ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) (1)	**3,781.85**	**454.88**	**515.89**	**50.19**	**38.58**	**1.38**	**4,842.77**
1. Energy	**2,052.17**	**5.52**	**64.13**				**2,121.82**
A. Fuel Combustion (Sectoral Approach)	1,929.27	3.59	64.13				1,996.99
1. Energy Industries	7.43	0.04	0.12				7.59
2. Manufacturing Industries and Construction	458.70	0.36	25.78				484.84
3. Transport	803.26	1.91	32.77				837.93
4. Other Sectors	659.88	1.29	5.46				666.62
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	122.90	1.93	NA,NO				124.83
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	122.90	1.93	NA,NO				124.83
2. Industrial Processes	**863.60**	**0.96**	**NA,NE,NO**	**50.19**	**38.58**	**1.38**	**954.71**
A. Mineral Products	51.45	NE,NO	NE,NO				51.45
B. Chemical Industry	0.39	NE,NO	NE,NO	NA	NA	NA	0.39
C. Metal Production	811.76	0.96	NA	NA,NE,NO	38.58	NA,NO	851.30
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 (2)				50.19	0.00	1.38	51.57
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.60**		**3.57**				**7.16**
4. Agriculture		**239.85**	**365.68**				**605.53**
A. Enteric Fermentation		212.78					212.78
B. Manure Management		27.07	41.27				68.34
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils(3)		NA,NE,NO	324.41				324.41
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry(1)	**855.41**	**7.80**	**74.62**				**937.83**
A. Forest Land	-138.95	NE,NO	1.03				-137.92
B. Cropland	1,117.47	NE,NO	IE,NA,NE,NO				1,117.47
C. Grassland	-132.38	NE,NO	NE,NO				-132.38
D. Wetlands	9.11	7.80	NA,NO				16.91
E. Settlements	0.16	NE	NE				0.16
F. Other Land	NE	NE	NE				NE
G. Other	NA,NE,NO	NA,NE,NO	73.59				73.59
6. Waste	**7.09**	**200.74**	**7.90**				**215.72**
A. Solid Waste Disposal on Land	NA,NE	195.06					195.06
B. Waste-water Handling		4.45	7.18				11.63
C. Waste Incineration	7.09	0.98	0.44				8.50
D. Other	NA	0.25	0.28				0.53
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: (4)							
International Bunkers	576.21	0.45	4.98				581.64
Aviation	380.00	0.06	3.33				383.39
Marine	196.21	0.39	1.65				198.25
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,904.94
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,842.77

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2005

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS

(Sheet 1 of 1)

Inventory 2005
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,674.82**	**450.57**	**524.90**	**58.42**	**26.10**	**2.64**	**4,737.45**
1. Energy	**1,998.59**	**5.30**	**71.70**				**2,075.58**
A. Fuel Combustion (Sectoral Approach)	1,882.24	3.21	71.70				1,957.14
1. Energy Industries	9.22	0.03	0.12				9.37
2. Manufacturing Industries and Construction	419.21	0.35	27.84				447.40
3. Transport	808.94	1.57	38.43				848.93
4. Other Sectors	644.87	1.26	5.31				651.44
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	116.36	2.09	NA,NO				118.45
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	116.36	2.09	NA,NO				118.45
2. Industrial Processes	**846.48**	**0.97**	**NA,NE,NO**	**58.42**	**26.10**	**2.64**	**934.60**
A. Mineral Products	55.72	NE,NO	NE,NO				55.72
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	790.76	0.97	NA	NA,NE,NO	26.09	NA,NO	817.82
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				58.42	0.00	2.64	61.06
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.53**		**3.35**				**6.88**
4. Agriculture		**241.79**	**366.51**				**608.30**
A. Enteric Fermentation		214.19					214.19
B. Manure Management		27.60	41.74				69.34
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	324.77				324.77
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**821.88**	**7.80**	**75.22**				**904.91**
A. Forest Land	-158.87	NE,NO	1.05				-157.82
B. Cropland	1,112.15	NE,NO	IE,NA,NE,NO				1,112.15
C. Grassland	-140.68	NE,NO	NE,NO				-140.68
D. Wetlands	9.11	7.80	NA,NE,NO				16.91
E. Settlements	0.18	NE	NE				0.18
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	74.17				74.17
6. Waste	**4.33**	**194.71**	**8.13**				**207.17**
A. Solid Waste Disposal on Land	NA,NE	189.38					189.38
B. Waste-water Handling		4.54	7.39				11.94
C. Waste Incineration	4.33	0.37	0.27				4.97
D. Other	NA	0.42	0.47				0.89
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	532.59	0.28	4.62				537.50
Aviation	421.63	0.06	3.69				425.39
Marine	110.96	0.22	0.93				112.11
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	3,832.54
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	4,737.45

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2006

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Inventory 2006
(Sheet 1 of 1) Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**3,832.12**	**473.55**	**551.76**	**58.76**	**333.22**	**2.64**	**5,252.05**
1. Energy	**2,066.21**	**6.31**	**70.45**				**2,142.97**
A. Fuel Combustion (Sectoral Approach)	1,929.57	3.28	70.45				2,003.30
1. Energy Industries	8.49	0.06	0.21				8.75
2. Manufacturing Industries and Construction	406.89	0.32	25.31				432.52
3. Transport	951.27	1.80	40.30				993.37
4. Other Sectors	562.92	1.10	4.64				568.66
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	136.65	3.03	NA,NO				139.67
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	136.65	3.03	NA,NO				139.67
2. Industrial Processes	**954.33**	**0.99**	**NA,NE,NO**	**58.76**	**333.22**	**2.64**	**1,349.95**
A. Mineral Products	62.72	NE,NO	NE,NO				62.72
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	891.62	0.99	NA	NA,NE,NO	333.22	NA,NO	1,225.83
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				58.76	0.00	2.64	61.40
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.89**		**3.36**				**7.25**
4. Agriculture		**245.95**	**392.70**				**638.65**
A. Enteric Fermentation		217.24					217.24
B. Manure Management		28.72	41.70				70.42
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [(3)]		NA,NE,NO	351.00				351.00
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [(1)]	**802.80**	**9.10**	**76.61**				**888.51**
A. Forest Land	-165.34	NE,NO	1.11				-164.23
B. Cropland	1,105.92	NE,NO	IE,NA,NE,NO				1,105.92
C. Grassland	-147.99	0.07	0.03				-147.89
D. Wetlands	9.11	9.03	0.45				18.60
E. Settlements	1.09	NE	NE				1.09
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	75.02				75.02
6. Waste	**4.88**	**211.19**	**8.64**				**224.71**
A. Solid Waste Disposal on Land	NA,NE	205.50					205.50
B. Waste-water Handling		4.66	7.60				12.26
C. Waste Incineration	4.88	0.36	0.30				5.53
D. Other	NA	0.67	0.74				1.42
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	637.13	0.35	5.53				643.00
Aviation	499.89	0.07	4.38				504.35
Marine	137.23	0.27	1.15				138.66
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	4,363.54
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	5,252.05

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2007

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS

(Sheet 1 of 1)

Inventory 2007

Submission 2013 v1.1

ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) (1)	**4,072.59**	**474.05**	**570.44**	**61.98**	**281.13**	**3.00**	**5,463.19**
1. Energy	**2,121.33**	**7.30**	**70.84**				**2,199.46**
A. Fuel Combustion (Sectoral Approach)	1,975.57	3.34	70.84				2,049.75
1. Energy Industries	23.81	0.07	0.25				24.12
2. Manufacturing Industries and Construction	386.54	0.31	25.38				412.24
3. Transport	986.01	1.84	40.45				1,028.30
4. Other Sectors	579.20	1.13	4.76				585.09
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	145.76	3.96	NA,NO				149.71
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	145.76	3.96	NA,NO				149.71
2. Industrial Processes	**1,153.08**	**1.04**	**NA,NE,NO**	**61.98**	**281.13**	**3.00**	**1,500.22**
A. Mineral Products	64.52	NE,NO	NE,NO				64.52
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	1,088.56	1.04	NA	NA,NE,NO	281.13	NA,NO	1,370.72
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 (2)				61.98	0.00	3.00	64.98
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**4.03**		**3.80**				**7.83**
4. Agriculture		**250.09**	**409.65**				**659.74**
A. Enteric Fermentation		220.42					220.42
B. Manure Management		29.67	42.46				72.13
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils(3)		NA,NE,NO	367.19				367.19
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry(1)	**786.19**	**8.22**	**77.09**				**871.50**
A. Forest Land	-172.98	NE,NO	1.14				-171.84
B. Cropland	1,100.83	NE,NO	IE,NA,NE,NO				1,100.83
C. Grassland	-151.48	NE,NO	NE,NO				-151.48
D. Wetlands	9.60	8.22	NA,NE,NO				17.82
E. Settlements	0.22	NE	NE				0.22
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	75.95				75.95
6. Waste	**7.98**	**207.40**	**9.06**				**224.44**
A. Solid Waste Disposal on Land	NA,NE	202.42					202.42
B. Waste-water Handling		3.79	7.80				11.59
C. Waste Incineration	7.98	0.35	0.33				8.66
D. Other	NA	0.84	0.93				1.77
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: (4)							
International Bunkers	718.45	0.49	6.21				725.15
Aviation	511.53	0.08	4.48				516.09
Marine	206.92	0.41	1.73				209.06
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	4,591.69
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	5,463.19

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2008

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS

(Sheet 1 of 1)

Inventory 2008

Submission 2013 v1.1

ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs [2]	PFCs [2]	SF_6 [2]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**4,377.83**	**469.70**	**582.13**	**70.64**	**349.00**	**3.15**	**5,852.45**
1. Energy	**1,999.42**	**7.47**	**67.78**				**2,074.66**
A. Fuel Combustion (Sectoral Approach)	1,815.15	3.11	67.78				1,886.04
1. Energy Industries	7.92	0.05	0.20				8.17
2. Manufacturing Industries and Construction	344.25	0.28	24.23				368.76
3. Transport	932.13	1.74	38.99				972.86
4. Other Sectors	530.86	1.03	4.37				536.25
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	184.27	4.35	NA,NO				188.62
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	184.27	4.35	NA,NO				188.62
2. Industrial Processes	**1,595.86**	**0.88**	**NA,NE,NO**	**70.64**	**349.00**	**3.15**	**2,019.53**
A. Mineral Products	62.86	NE,NO	NE,NO				62.86
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	1,533.00	0.88	NA	NA,NE,NO	349.00	NA,NO	1,882.88
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [2]				70.64	0.00	3.15	73.79
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.55**		**3.63**				**7.18**
4. Agriculture		**252.64**	**423.65**				**676.29**
A. Enteric Fermentation		223.04					223.04
B. Manure Management		29.60	41.44				71.04
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [3]		NA,NE,NO	382.21				382.21
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [1]	**772.70**	**8.22**	**77.93**				**858.86**
A. Forest Land	-177.07	NE,NO	1.13				-175.93
B. Cropland	1,095.15	NE,NO	IE,NA,NE,NO				1,095.15
C. Grassland	-155.06	NE,NO	NE,NO				-155.06
D. Wetlands	9.60	8.22	NA,NE,NO				17.82
E. Settlements	0.08	NE	NE				0.08
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	76.80				76.80
6. Waste	**6.31**	**200.49**	**9.13**				**215.93**
A. Solid Waste Disposal on Land	NA,NE	195.74					195.74
B. Waste-water Handling		3.53	7.85				11.38
C. Waste Incineration	6.31	0.33	0.30				6.93
D. Other	NA	0.89	0.99				1.88
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [4]							
International Bunkers	656.36	0.51	5.64				662.52
Aviation	427.83	0.06	3.75				431.64
Marine	228.53	0.45	1.90				230.88
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	4,993.59
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	5,852.45

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2009

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Inventory 2009
(Sheet 1 of 1) Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs [(2)]	PFCs [(2)]	SF_6 [(2)]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**4,319.39**	**467.18**	**547.96**	**95.01**	**152.75**	**3.17**	**5,585.47**
1. Energy	**1,952.48**	**7.97**	**60.77**				**2,021.22**
A. Fuel Combustion (Sectoral Approach)	1,784.02	3.14	60.77				1,847.93
1. Energy Industries	8.81	0.05	0.18				9.04
2. Manufacturing Industries and Construction	247.27	0.20	16.69				264.17
3. Transport	905.31	1.69	38.83				945.84
4. Other Sectors	622.64	1.19	5.06				628.89
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	168.45	4.83	NA,NO				173.29
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	168.45	4.83	NA,NO				173.29
2. Industrial Processes	**1,608.77**	**0.91**	**NA,NE,NO**	**95.01**	**152.75**	**3.17**	**1,860.61**
A. Mineral Products	30.05	NE,NO	NE,NO				30.05
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	1,578.72	0.91	NA	NA,NE,NO	152.75	NA,NO	1,732.38
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [(2)]				95.01	0.00	3.17	98.19
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**3.16**		**3.15**				**6.31**
4. Agriculture		**255.43**	**396.00**				**651.43**
A. Enteric Fermentation		225.68					225.68
B. Manure Management		29.75	42.92				72.68
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils[(3)]		NA,NE,NO	353.08				353.08
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry[(1)]	**747.56**	**8.33**	**78.69**				**834.57**
A. Forest Land	-191.03	NE,NO	1.17				-189.85
B. Cropland	1,087.18	NE,NO	IE,NA,NE,NO				1,087.18
C. Grassland	-158.40	NE,NO	NE,NO				-158.40
D. Wetlands	9.72	8.33	NA,NE,NO				18.05
E. Settlements	0.08	NE	NE				0.08
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	77.52				77.52
6. Waste	**7.43**	**194.53**	**9.35**				**211.32**
A. Solid Waste Disposal on Land	NA,NE	189.64					189.64
B. Waste-water Handling		3.51	7.88				11.39
C. Waste Incineration	7.43	0.32	0.29				8.03
D. Other	NA	1.07	1.18				2.25
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [(4)]							
International Bunkers	498.71	0.37	4.29				503.38
Aviation	333.88	0.05	2.92				336.85
Marine	164.84	0.32	1.37				166.53
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	4,750.90
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	5,585.47

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2010

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2010
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) (1)	**4,140.42**	**467.80**	**532.54**	**122.54**	**145.63**	**4.89**	**5,413.81**
1. Energy	**1,807.12**	**7.02**	**55.02**				**1,869.15**
A. Fuel Combustion (Sectoral Approach)	1,618.13	2.89	55.02				1,676.04
1. Energy Industries	6.69	0.04	0.16				6.89
2. Manufacturing Industries and Construction	199.36	0.17	13.21				212.74
3. Transport	861.59	1.61	37.14				900.34
4. Other Sectors	550.49	1.07	4.51				556.07
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	188.99	4.13	NA,NO				193.12
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	188.99	4.13	NA,NO				193.12
2. Industrial Processes	**1,615.82**	**0.90**	**NA,NE,NO**	**122.54**	**145.63**	**4.89**	**1,889.78**
A. Mineral Products	10.64	NE,NO	NE,NO				10.64
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	1,605.18	0.90	NA	NA,NE,NO	145.63	NA,NO	1,751.71
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 (2)				122.54	0.01	4.89	127.43
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**2.74**		**3.41**				**6.15**
4. Agriculture		**257.19**	**385.66**				**642.84**
A. Enteric Fermentation		227.60					227.60
B. Manure Management		29.59	42.94				72.53
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils(3)		NA,NE,NO	342.72				342.72
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry(1)	**708.61**	**8.33**	**78.86**				**795.80**
A. Forest Land	-215.22	NE,NO	1.21				-214.02
B. Cropland	1,078.95	NE,NO	IE,NA,NE,NO				1,078.95
C. Grassland	-164.92	NE,NO	NE,NO				-164.92
D. Wetlands	9.72	8.33	NA,NE,NO				18.05
E. Settlements	0.08	NE	NE				0.08
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	77.65				77.65
6. Waste	**6.13**	**194.36**	**9.59**				**210.08**
A. Solid Waste Disposal on Land	NA,NE	189.27					189.27
B. Waste-water Handling		3.51	7.93				11.44
C. Waste Incineration	6.13	0.29	0.25				6.67
D. Other	NA	1.28	1.42				2.70
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: (4)							
International Bunkers	559.61	0.41	4.81				564.84
Aviation	377.26	0.06	3.30				380.62
Marine	182.35	0.36	1.51				184.21
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	4,618.01
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	5,413.81

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

2011

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 2011
Submission 2013 v1.1
ICELAND

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs [2]	PFCs [2]	SF_6 [2]	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**3,991.45**	**452.67**	**527.70**	**121.35**	**63.22**	**3.13**	**5,159.53**
1. Energy	**1,712.12**	**6.08**	**51.56**				**1,769.76**
A. Fuel Combustion (Sectoral Approach)	1,533.43	2.71	51.56				1,587.70
1. Energy Industries	6.85	0.04	0.14				7.03
2. Manufacturing Industries and Construction	181.94	0.14	11.38				193.47
3. Transport	826.36	1.53	35.80				863.69
4. Other Sectors	518.29	1.00	4.23				523.52
5. Other	NA,NO	NA,NO	NA,NO				NA,NO
B. Fugitive Emissions from Fuels	178.68	3.37	NA,NO				182.05
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	178.68	3.37	NA,NO				182.05
2. Industrial Processes	**1,609.87**	**0.87**	**NA,NE,NO**	**121.35**	**63.22**	**3.13**	**1,798.44**
A. Mineral Products	21.15	NE,NO	NE,NO				21.15
B. Chemical Industry	NA,NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	1,588.72	0.87	NA	NA,NE,NO	63.22	NA,NO	1,652.81
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6 [2]				121.35	0.00	3.13	124.49
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**2.81**		**3.49**				**6.30**
4. Agriculture		**256.86**	**383.82**				**640.68**
A. Enteric Fermentation		226.97					226.97
B. Manure Management		29.89	43.86				73.75
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils [3]		NA,NE,NO	339.96				339.96
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry [1]	**658.70**	**8.33**	**79.25**				**746.28**
A. Forest Land	-250.67	NE,NO	1.22				-249.45
B. Cropland	1,072.41	NE,NO	IE,NA,NE,NO				1,072.41
C. Grassland	-173.21	NE,NO	NE,NO				-173.21
D. Wetlands	9.72	8.33	NA,NE,NO				18.05
E. Settlements	0.46	NE	NE				0.46
F. Other Land	NE	NE	NE				NE
G. Other	NE,NO	NA,NE,NO	78.03				78.03
6. Waste	**7.96**	**180.53**	**9.59**				**198.07**
A. Solid Waste Disposal on Land	NA,NE	175.51					175.51
B. Waste-water Handling		3.53	7.98				11.51
C. Waste Incineration	7.96	0.29	0.28				8.53
D. Other	NA	1.20	1.33				2.53
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Memo Items: [4]							
International Bunkers	620.60	0.45	5.34				626.39
Aviation	421.93	0.06	3.70				425.69
Marine	198.66	0.39	1.64				200.70
Multilateral Operations	**NO**	**NO**	**NO**				**NO**
CO_2 Emissions from Biomass	**NA,NO**						**NA,NO**

Total CO_2 Equivalent Emissions without Land Use, Land-Use Change and Forestry	4,413.25
Total CO_2 Equivalent Emissions with Land Use, Land-Use Change and Forestry	5,159.53

(1) For CO_2 from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(2) Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

(3) Parties which previously reported CO_2 from soils in the Agriculture sector should note this in the NIR.

(4) See footnote 8 to table Summary 1.A.

Annex 3 Summary of reporting of supplementary information under Article7, paragraph 2, of the Kytoto Protocol in NC6

Information reported under Article 7, paragraph 2	**NC6 Chapter**
National system in accordance with Article 5, paragraph 1	3.2
National registry	3.2.9
Policies and measures in accordance with Article 2	4
Legislative arrangements and enforcement and administrative procedures	4.1
Information under article 10 Art 10 a Art 10b Art 10c Art 10d Art 10e	 3.2 4.2, 6 7.5 8 7.3, 9
Financial resources	7

Contributors

Anna Borgþórsdóttir Olsen	Ministry of Finance and Economic Affairs
Arnór Snorrason	Iceland Forest Service
Birna Hallsdóttir	UMÍS ehf. Environice
Bjarni D Sigurðsson	Agricultural University of Iceland
Christoph Wöll	Environment Agency of Iceland
Halldór Björnsson	Icelandic Met Office
Hermann Sveinbjörnsson	Ministry for the Environment and Natural Resources
Hugi Ólafsson	Ministry for the Environment and Natural Resources
Jón Ólafsson	University of Iceland
Kristján Andrésson	Environment Agency of Iceland
Pálína Björk Matthíasdóttir	Ministry for Foreign Affairs
Sigurður Reynir Gíslason	University of Iceland
Sólveig Rósa Ólafsdóttir	Marine Research Institute
Stefán Einarsson	Ministry for the Environment and Natural Resources
Þorsteinn I Sigfússon	Innovation Center Iceland