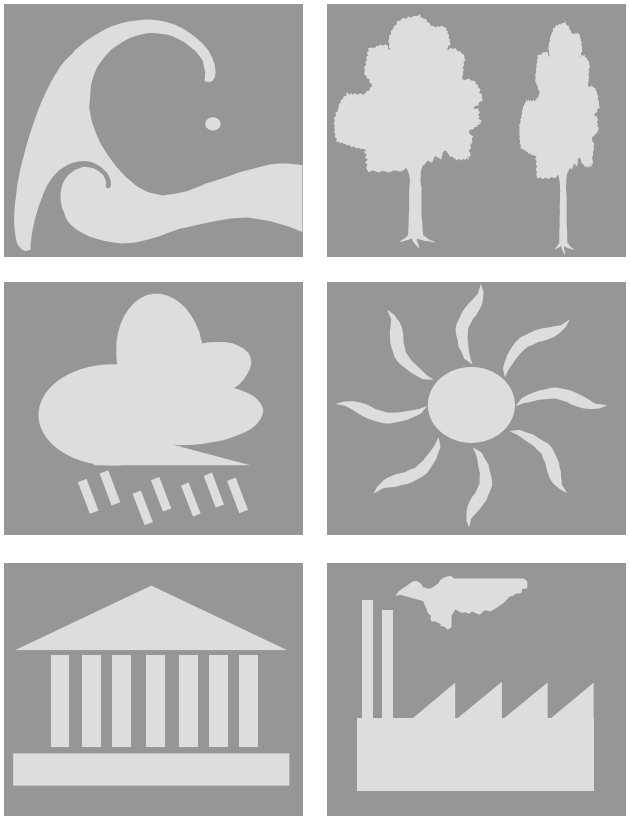
HELLENIC REPUBLIC

MINISTRY OF ENVIRONMENT AND ENERGY



FOURTH BIENNIAL REPORT UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

JANUARY 2020

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1 Introduction

This report and its accompanying tabular information (**BR CTF Tables**) constitute the 4th Biennial Report of Greece, as required under Decision 2/CP.17 of the Conference of the Parties under the United Nations Framework Convention on Climate Change (UNFCCC). This report was prepared by the Ministry of Environment and Energy, with the external consultancy assistance of the National Technical University of Athens (School of Chemical Engineering).

In accordance with the UNFCCC biennial reporting guidelines for developed country Parties, the information is structured into:

- Information on greenhouse gases (GHG) emissions and trends and the GHG inventory including information on national inventory system;
- Quantified economy-wide emission reduction target;
- Progress in achievement of the quantified economy-wide emission reduction targets;
- Projections; and
- Provision of financial, technological and capacity building support to developing countries.

2 Information on GHG emissions and trends

2.1 Summary information on GHG emissions and trends

In this chapter summary information on greenhouse gas (GHG) emissions in Greece for the period 1990-2017 is presented, consistently with the most recently submitted annual GHG national inventory (2019 inventory submission of Greece)[1].

Emissions estimates were calculated in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. It is noted that according to the UNFCCC inventory reporting guidelines[2], emissions estimates for international marine and aviation bunkers were not included in the national totals, however they are reported separately as memo items.

In 2017, GHG emissions (without LULUCF) amounted to 95.42 Mt CO2 eq showing a decrease of 7.45% compared to 1990 levels. If emissions / removals from LULUCF were to be included then the decrease would be 8.70 %.

Carbon dioxide emissions accounted for 78.44% of total GHG emissions in 2017 (without LULUCF) and decreased by approximately 10.23% from 1990. Methane emissions accounted for 10.39% of total GHG emissions in 2017 and decreased by 9.10% from 1990, while nitrous oxide emissions accounted for 4.56% of the total GHG emissions in 2017 and decreased by 41.54% from 1990. Finally, f-gases emissions (from production and consumption) that accounted for 6.61% of total GHG emissions in 2017 were increased by 49.40% from 1995 (base year for F-gases for KP accounting).

An overview of total GHG emissions for the time period 1990 – 2017, along with the contribution of each sector to the total GHG emissions are presented below in ***Figure 1***. Detailed information on total GHG emissions and the share of each sector are presented in the **CTF Tables 1s, 1(a), 1(b), 1(c) and 1(d)**.

[1] https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2019

[2] Decision 24/CP.19.

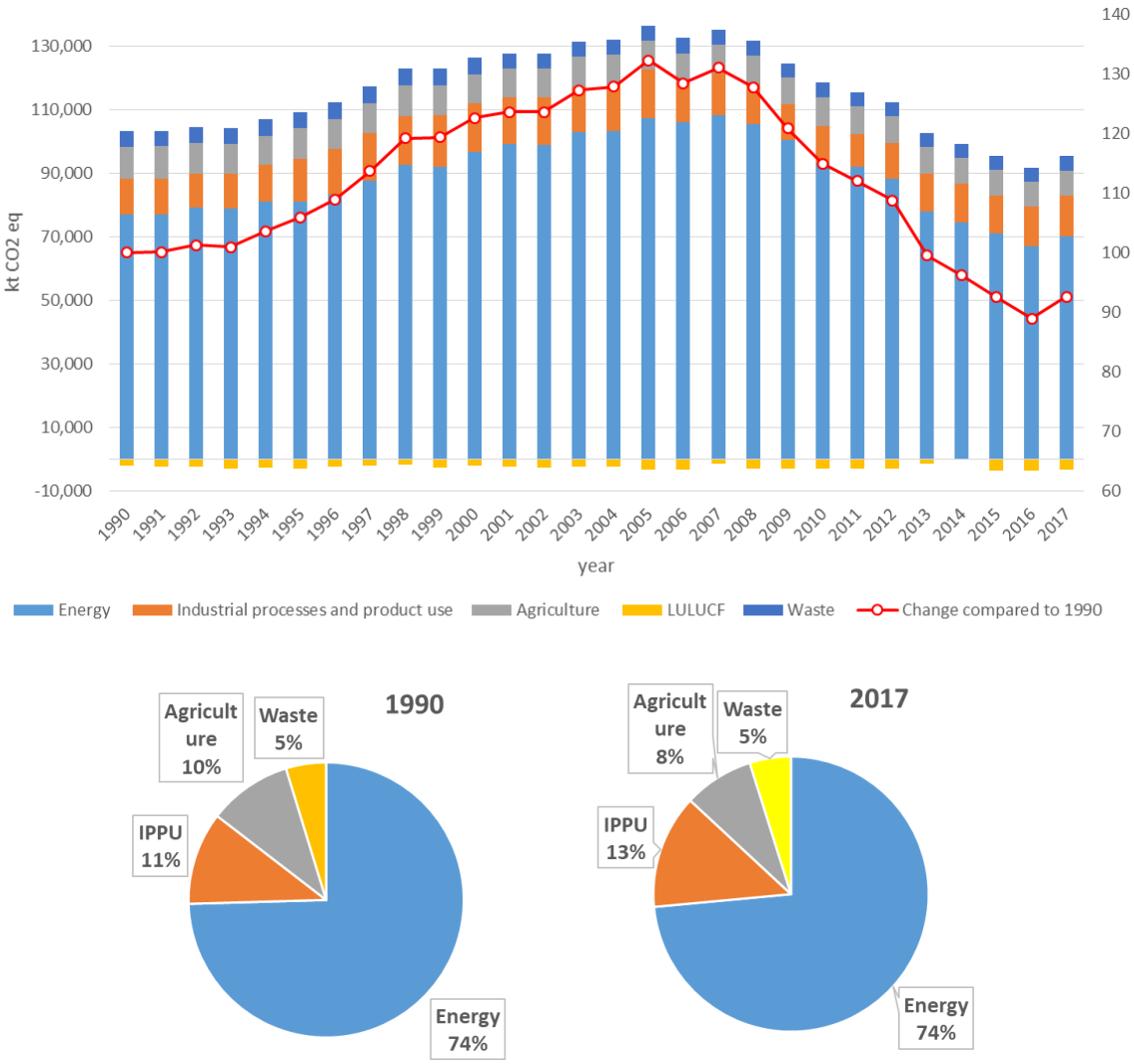


Figure 1. Trend of total GHG emissions for the period 1990-2017, and the share of each sector.

Emissions from **Energy** in 2017 accounted for 73. 5% of total GHG emissions (without LULUCF) and decreased by approximately 8.74% compared to 1990 levels.

The living standards improvement, due to the economic growth, the important growth of the services sector and the introduction of natural gas in the Greek energy system represent the basic factors affecting emissions trends from Energy for the period 1990 – 2007. For the period 2008 – 2017, the emissions have a decreasing trend. In 2017, the emissions have increased by 5% compared to 2016, mainly because of an increase of the solid fuels use under 1A1a category.

The living standards improvement resulted in an increase of energy consumption and particularly electricity consumption (mainly in the residential – tertiary sector), passenger cars ownership and

transportation activity. The increase of electricity consumption led not only to the increase of direct emissions (due to combustion for electricity generation) but also of fugitive methane emissions from lignite mining. At the same time total CO2 emissions per electricity produced have decreased mainly as a result of the introduction of the natural gas and RES into the electricity system. It should be mentioned that the availability of hydropower has a significant effect to emissions trends. For instance, the significant increase of electricity demand in 1999 was not followed by a similar increase of emissions because of the penetration of natural gas and the high availability of hydropower.

The decreasing trend of emissions of energy of the years 2008-2016 is attributed mainly to the economic recession that the country is facing, but also to the effect of mitigation actions (i.e. RES, energy efficiency measures, road infrastructure and public transportation improvements, etc).

The majority of GHG emissions (56.9%) in 2017 derived from energy industries, while the contribution of transport, manufacturing industries and construction and other sectors is estimated at 24.6%, 8.2% and 8.6% respectively. The rest 1.4% and 0.3% of total GHG emissions from Energy derived from fugitive emissions from fuels and other (mobile). Within the fuel combustion activities, the only sector with increased emissions compared to 1990 is transport, showing an increase of 20.1%. Emissions from manufacturing industries and construction emissions, energy industries and other sectors (i.e. residential, tertiary and agriculture sectors) had decreased by around 38.5%, 7.7% and 28.9%, respectively, compared to 1990. The decrease in the other sectors is noticeable during the recent years. Finally, fugitive emissions from fuels decreased by 20.9% for the period 1990 – 2017.

Emissions from **Industrial Processes and Product Use** in 2017 accounted for 13.40% of the total emissions (excluding LULUCF) and increased by 13.89% compared to 1990 levels. Emissions from IPPU are characterized by intense fluctuations during the period 1990 – 2017 reaching a minimum value of 10.32 Mt CO2 eq in 2011 and a maximum value of 16.39 Mt CO2 eq in 1999. The low value for 2011 is directly related to the effects of the economic recession whereas the maximum value is attributed to changes in industrial production and especially in HCFC-22 production. It should be noted that had it not been for the consumption of f-gases subcategory, the decrease of the recent years would have been much deeper.

Emissions from **Agriculture** that accounted for 8.23% of total emissions in 2017 (without LULUCF), decreased by approximately 22.6% compared to 1990 levels. Emissions reduction is mainly due to the reduction of N2O emissions from agricultural soils, because of the reduction in the use of synthetic nitrogen fertilizers and animal population. The decrease in the use of synthetic nitrogen fertilizers is attributed to the increase of organic farming, the high price of fertilizers and

the impact of initiatives to promote good practice in fertilizer use. The changes of the rest determining parameters of GHG emissions from the sector (e.g. crops production etc.) have a minor effect on GHG emissions trend.

Emissions from the **Waste** sector (4.85% of the total emissions, without LULUCF), decreased by approximately 4.80% from 1990. Living standards improvement resulted in an increase of the generated waste and thus of emissions. However, the increase of recycling along with the exploitation of the biogas produced limits the increase of methane emissions. At the same time, emissions from wastewater handling have considerably decreased, due to the continuous increase of the population served by aerobic wastewater handling facilities.

The **Land Use, Land-Use Change and Forestry** sector was a net sink of greenhouse gases during the period 1990 – 2017. The sink capacity of the LULUCF sector fluctuates between -0.13 Mt CO2 eq. and -3.72 Mt CO2 eq., showing an increasing trend. This is the result of the decrease of the sink capacity of the Cropland category on the one hand, and the increase of the sink capacity of the Forest Land category on the other.

Further information about GHG emissions and trends can be found in the respective chapters of the Greek National Inventory Report 2019[3].

2.2 Summary information on national inventory arrangements in accordance with the reporting requirements related to national inventory arrangements contained in the UNFCCC Annex I inventory reporting guidelines

The **Ministry of Environment and Energy, MEEN**, is the governmental body responsible for the development and implementation of environmental policy in Greece, as well as for the provision of information concerning the state of the environment in Greece in compliance with relevant requirements defined in international conventions, protocols and agreements. Moreover, the MEEN is responsible for the co-ordination of all involved ministries, as well as any relevant public or private organization, in relation to the implementation of the provisions of the Kyoto Protocol, according to the Law 3017/2002 with which Greece ratified the Kyoto Protocol.

In this context, the MEEN has the overall responsibility for the national GHG inventory, and the official consideration and approval of the inventory prior to its submission. (Contact person:

[3] https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2019

Kyriakos Psychas, Address: Patission 147, Athens, Greece, e-mail: k.psychas@prv.ypeka.gr, tel.: +30210 8665938).

Figure 2 provides an overview of the organizational structure of the National Inventory System. The entities participating in it are:

- The **Division of Climate Change and Air Quality of MEEN** designated as the national entity responsible for the national inventory, which keeps the overall responsibility, but also plays an active role in the inventory planning, preparation and management.

- The preparation of the annual inventory has been assigned to **National Technical University of Athens (NTUA) / School of Chemical Engineering**, on a contract basis by MEEN.

- **Governmental ministries and agencies** through their appointed focal persons, ensure the data provision

International or national associations, along with individual public or private industrial companies contribute to data providing and development of methodological issues as appropriate.

The legal framework defining the roles-responsibilities and the co-operation between the MEEN Climate team, the Inventory team and the designated contact points of the competent Ministries was formalized by the Joint Ministerial Decision 22993/2017 (OG B' 1710) entitled "Structure and operation of the National Greenhouse Gases Inventory System". The above-mentioned decision defines the competent authority and its responsibilities concerning the inventory preparation, data providing or other relative information. This formal framework establishes an Interministerial Technical Working Group for the collaboration between the entities involved, assuring the timely collection and quality of the activity data required and solving data access restriction problems raised due to confidentiality issues.

According to the Presidential Decree No 189 dated 5th November 2009 the Ministry of Environment and Energy retained the responsibilities regarding the Environment, and Physical Planning of the former Ministry for the Environment, Physical Planning and Public Works. Furthermore, the General Directorate of Energy and Natural Resources, previously belonging to the Ministry of Development, as well as the General Directorate of Forest Development and Protection and Natural Resources, previously belonging to the Ministry of Rural Development and Food, are now a significant part of the Ministry of Environment and Energy (MEEN). These two authorities are currently called the "General Directorate of Energy" and the "General Directorate of Forests and Forest Environment" of MEEN respectively.

More information about the national inventory arrangements can be found on chapter 1.2 of the NIR of Greece.[4]

Concerning the changes of the national arrangements of Greece since the 3rd Biennial Report, the following changes were performed:

- With regard to the preparation of the annual inventory of LULUCF sector, the compilation of the LULUCF inventory (UNFCCC and KP LULUCF) of the 2019 GHG inventory submission was a responsibility of an independent consultant. For the 2020 submission, the responsibility for the compilation of the LULUCF inventory (UNFCCC and KP LULUCF) is assigned to National Technical University of Athens (NTUA).

[4] https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories/submissions-of-annual-greenhouse-gas-inventories-for-2017/submissions-of-annual-ghg-inventories-2015

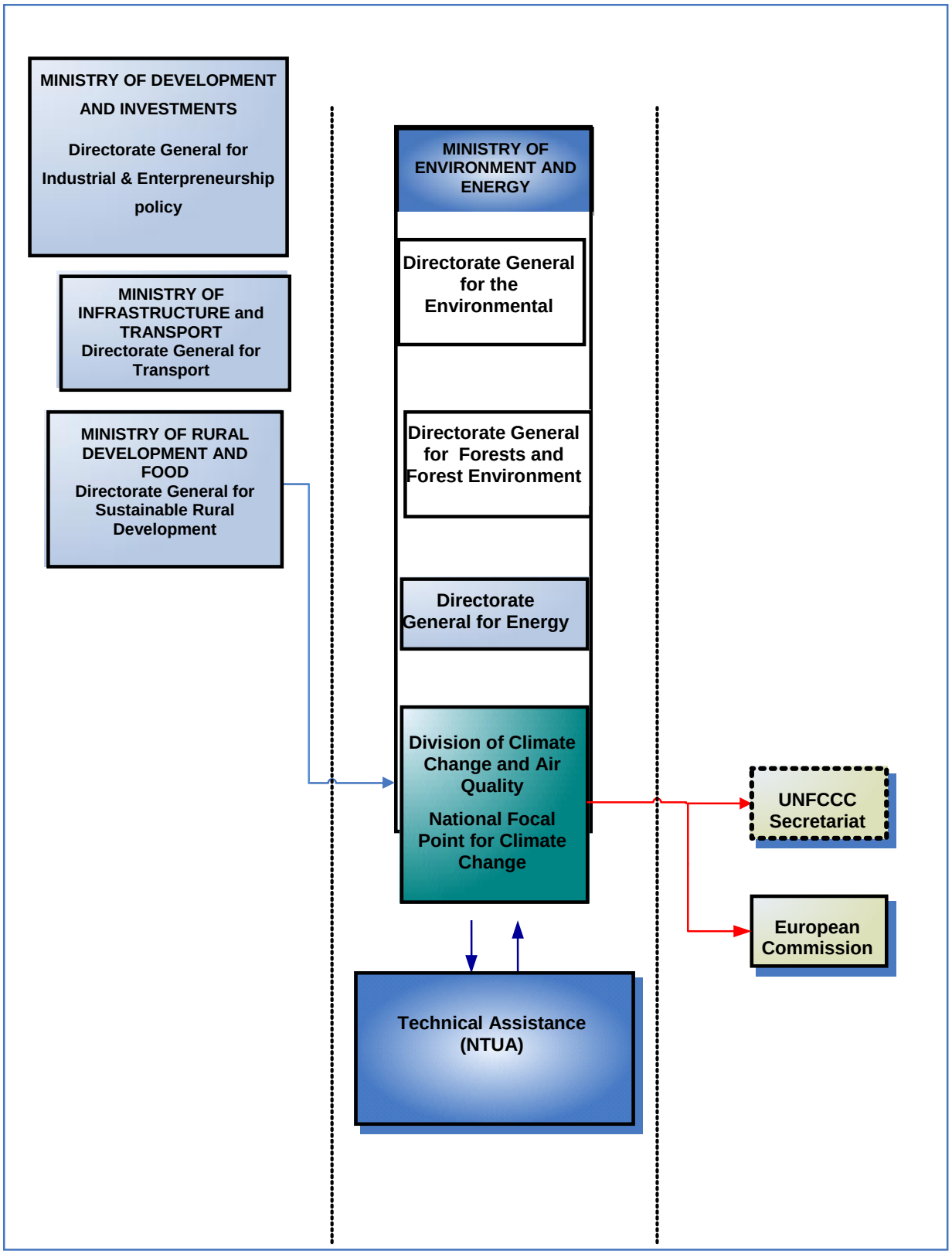


Figure 2. Organizational Structure of the National Inventory System.

3 Quantified economy-wide emission reduction target (QEERT)

3.1 Description of the 2020 EU pledge (QEERT)

Greece, as a Member State of EU, is under the joint quantified economy-wide emission reduction target of EU and its Member States. This section explains this target and the target compliance architecture set up within the EU in order to meet that target.

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20 % compared to 1990 levels, in order to contribute to achieving the ultimate objective of the UNFCCC: 'to stabilize GHG concentrations at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system', or, in other words, to limit the global temperature increase to less than 2°C compared to temperature levels before industrialization (FCCC/CP/2010/7/Add.1). The EU is also committed to raising this target to a 30 % emission reduction by 2020 compared with 1990 levels, provided that other developed countries also commit to achieving comparable emission reductions, and that developing countries contribute adequately, according to their responsibilities and respective capabilities. This offer was reiterated in the submission to the UNFCCC by the EU-28 and Iceland on 30 April 2014[5].

The definition of the Convention target for 2020 (QEERT) is documented in the revised note provided by the UNFCCC Secretariat on the 'Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention' (FCCC/SB/2011/INF.1/Rev.1 of 7 June 2011). In addition, the EU provided additional information relating to its quantified economy-wide emission reduction target in a submission as part of the process of clarifying the developed country Parties' targets in 2012 (FCCC/AWGLCA/2012/MISC.1).

The EU clarified that the accounting rules for the target under the UNFCCC are more ambitious than the current rules under the Kyoto Protocol, for example, including international aviation, adding an annual compliance cycle for emissions under the Effort Sharing Decision or higher Clean Development Mechanism (CDM) quality standards under the EU Emissions Trading System (EU ETS) (FCCC/TP/2013/7). Accordingly, the following assumptions and conditions apply to the EU's 20 % target under the UNFCCC (QEERT):

[5] European Union, its Member States and Iceland submission pursuant to par 9 of decision 1/CMP.8'

http://ec.europa.eu/clima/policies/international/negotiations/docs/eu_submission_20140430_en.pdf

- ✓ The EU Convention pledge does not include emissions/removals from Land Use, Land Use Change and Forestry, but it is estimated to be a net sink over the relevant period. EU inventories also include information on emissions and removals from LULUCF in accordance with relevant reporting commitments under the UNFCCC. Accounting for LULUCF activities only takes place under the Kyoto Protocol.
- ✓ The target covers the gases CO2, CH4, N2O, HFCs, PFCs and SF6.
- ✓ The target refers to 1990 as a single base year for all covered gases and all Member States.
- ✓ Emissions from international aviation to the extent it is included in the EU ETS are included in the target.
- ✓ A limited number of CERs, ERUs and units from new market-based mechanisms may be used to achieve the target: in the ETS, the use of international credits is capped (up to 50 % of the reduction required from EU ETS sectors by 2020). Quality standards also apply to the use of international credits in the EU ETS, including a ban on credits from LULUCF projects and certain industrial gas projects. In the ESD sectors, the annual use of international credits is limited to up to 3 % of each Member State's ESD emissions in 2005, with a limited number of Member States being permitted to use an additional 1 % from projects in Least Developed Countries (LDCs) or Small Island Developing States (SIDS), subject to conditions.
- ✓ The Global Warming Potentials (GWPs) used to aggregate GHG emissions up to 2020 under EU legislation were those based on the Second Assessment Report of the IPCC when the target was submitted. In accordance with the CMP Decision to revise the GWPs to those from the IPCC Fourth Assessment Report (AR4) revised GWPs from AR4 were adopted for the EU ETS. The revised GWPs were taken into account for the revision of the ESD target. For the implementation until 2020, GWPs from AR4 will be used consistently with the UNFCCC reporting guidelines for GHG inventories.

The QEERT target is also described in **CTF Tables 2(a-f)**.

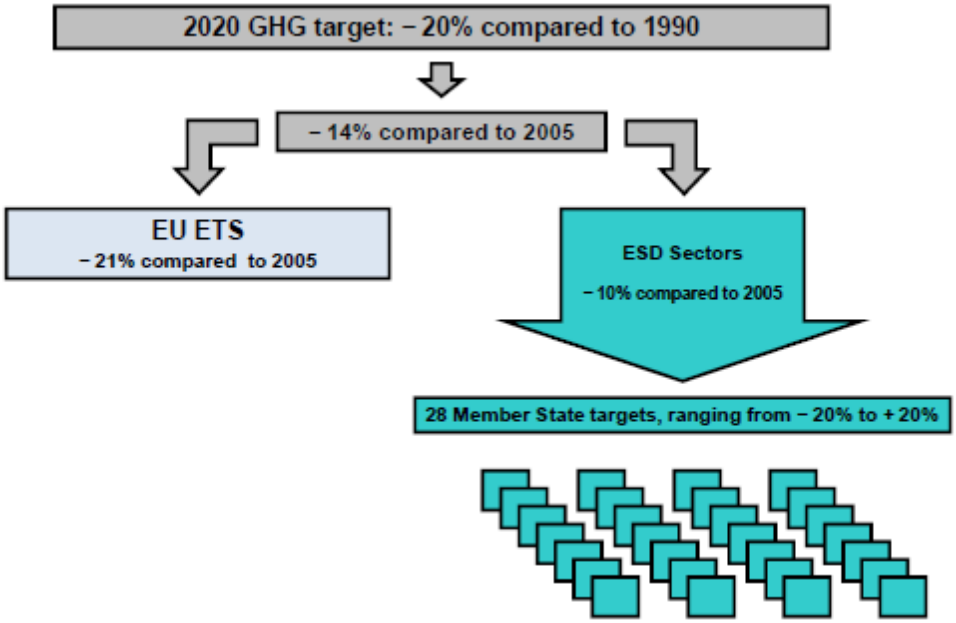
3.2 The EU target compliance architecture

3.2.1 The 2020 climate and energy package

In 2009 the EU established internal rules under its "2020 climate and energy package"6 – these underpin the EU implementation of the target under the Convention. The package introduced a clear approach to achieving the 20 % reduction of total GHG emissions from 1990 levels, which is equivalent to a 14 % reduction compared to 2005 levels. This 14 % reduction objective is divided between the ETS and ESD sectors. These two sub-targets are:

- ✓ a 21 % reduction target compared to 2005 for emissions covered by the ETS (including domestic and international aviation);
- ✓ a 10 % reduction target compared to 2005 for ESD sectors, shared between the 28 Member States (MS) through individual national GHG targets.

The distribution of the total target across the ETS and ESD is shown in ***Figure 3***.



Source: European Commission

Figure 3. GHG targets under the 2020 climate and energy package

Under the revised EU ETS Directive (Directive 2009/29/EC), a single ETS cap covers the EU Member States and three participating non-EU countries (Norway, Iceland and Liechtenstein), i.e. there are no further individual caps by country. Allowances allocated in the EU ETS from 2013 to 2020 decrease by 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012).

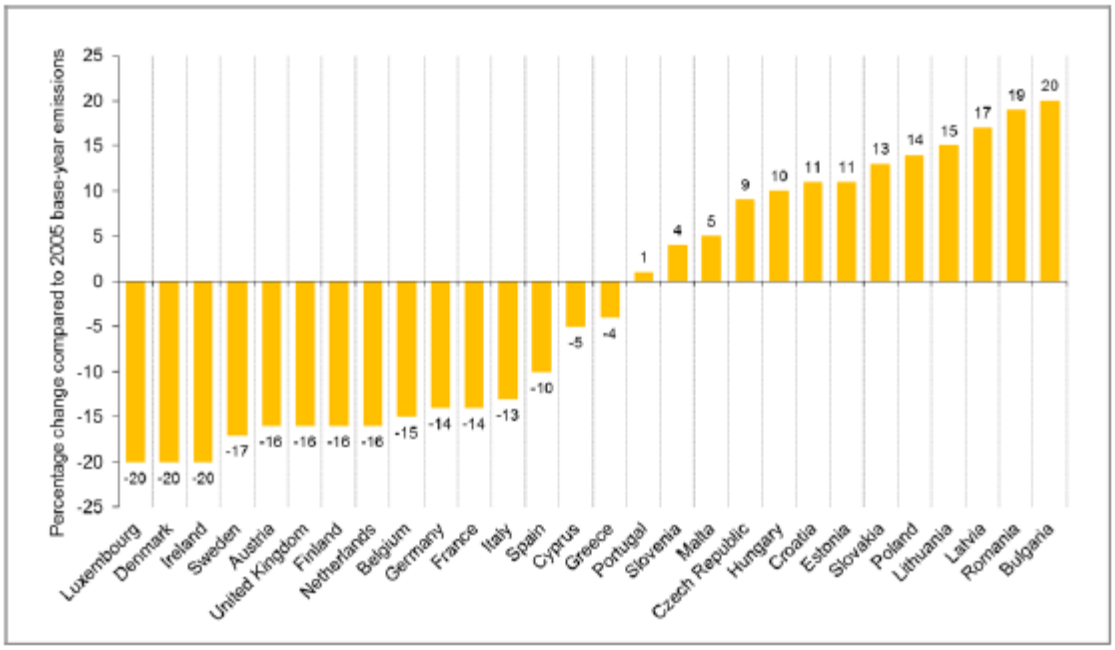
[6] http://ec.europa.eu/clima/policies/package/index_en.htm

The three non-EU countries participating in EU ETS (Norway, Iceland and Liechtenstein) are also subject to a similarly defined cap and the same annual decrease in allowance allocation. For further additional information on recent changes in the EU ETS see section 4.

The vast majority of emissions within the EU which fall outside the scope of the EU ETS are addressed under the Effort Sharing Decision (ESD) (Decision No 406/2009/EC). The ESD covers emissions from all sources outside the EU ETS, except for emissions from domestic and international aviation (which were included in the EU ETS from 1 January 2012), international maritime, and emissions and removals from land use, land-use change and forestry (LULUCF). It thus includes a diverse range of small-scale emitters in a wide range of sectors: transport (cars, trucks), buildings (in particular heating), services, small industrial installations, fugitive emissions from the energy sector, emissions of fluorinated gases from appliances and other sources, agriculture and waste. Such sources currently account for about 60 % of total GHG emissions in the EU.

While the EU ETS target is to be achieved by the EU as a whole, the ESD target was divided into national targets to be achieved individually by each Member State (see ***Figure 4***). Under the Effort Sharing Decision, national emission targets for 2020 are set, expressed as percentage changes from 2005 levels. These changes have been transferred into binding quantified annual reduction targets for the period from 2013 to 2020 (Commission Decision 2013/162/EU as amended by 2017/147/EU and Commission Decision 2013/634/EU), denominated in Annual Emission Allocations (AEAs). At country level, 2020 targets under the ESD range from -20 % to +20 %, compared to 2005 levels. ESD targets for 2020 for each EU Member State are shown in Figure 4.

The target levels have been set on the basis of Member States' relative Gross Domestic Product per capita. In addition, different levels of development in the EU-28 are taken into account by the provision of several flexibility options. Up to certain limitations, the ESD allows Member States to make use of flexibility provisions for meeting their annual targets: carry-over of over-achievements to subsequent years within each Member State, transfers of AEAs between Member States and the use of international credits (credits from Joint Implementation and the Clean Development Mechanism). Nevertheless ESD targets are designed in a strict manner: Every year, once MS emissions are reviewed according to strict criteria (described in Chapter III of the Commission Implementing Regulation 749/2014), the European Commission issues an implementing decision on MS ESD emissions in the given year. MS exceeding their annual AEA, even after taking into account the flexibility provisions and the use of JI/CDM credits, will face inter alia a penalty – a deduction from their emission allocation of the following year (excess emissions, multiplied by 1.08).



Source: EU Decision No 406/2009/EC, Annex 2

Figure 4. National 2020 GHG emission limits under the ESD, relative to 2005 emissions levels

The 2020 ESD target of Greece is to reduce emissions by 4% compared to 2005 levels. The binding quantified annual reduction targets for the period from 2013 to 2020, or the Annual Emission Allocations (AEAs) of Greece are presented in Table 1.

Table 1. Annual Emission Allocations (AEAs) of Greece for the year 2013 to 2020 calculated applying global warming potential values from the fourth IPCC assessment report

Year	AEAs (t CO2eq)
2013	58,955,025
2014	59,281,845
2015	59,608,666
2016	59,935,486
2017	59,131,332
2018	59,437,285
2019	59,743,238
2020	60,049,191

Table 2 Overview of EU targets

	International commitments				EU domestic legislation				
	Kyoto Protocol		UNFCCC	Paris Agreement	2020 Climate and Energy Package		2030 Climate and Energy Framework		
					EU ETS	ESD	EU ETS	ESR	LULUCF
Target year of period	First commitment period (2008-2012)	Second commitment period (2013-2020)	2020	2030	2013-2020		2021 – 2030		
Emission reduction target	-8 %	-20 %	-20 %	At least -40%	-21 % compared to 2005 for ETS emissions	Annual targets by MS. In 2020 -10 % compared to 2005 for non-ETS emissions	-43% for EU ETS sectors	-30% for ESR sectors (translated into individual binding targets for MSs)	No-debit target based on accounting rules
					Overall target: -20% GHG emission reduction vs 1990		Overall target: at least -40% domestic GHG emission reduction vs 1990		
Further targets	-	-	Conditional target of -30 % if other Parties take on adequate commitments	-	Renewable Energy Directive: 20 % share of renewable energy of gross final energy consumption; Energy Efficiency Directive : Increase energy efficiency by 20 %		A binding renewable energy target for the EU for 2030 of at least 32% of final energy consumption, including a review clause by 2023 for an upward revision of the EU level target. A headline target of at least 32.5% for energy efficiency to be achieved collectively by the EU in 2030, with an upward revision clause by 2023.		

	International commitments				EU domestic legislation				
	Kyoto Protocol		UNFCCC	Paris Agreement	2020 Climate and Energy Package		2030 Climate and Energy Framework		
					EU ETS	ESD	EU ETS	ESR	LULUCF
Base year	1990 KP Flexibility rules (Art 3(5)) regarding F-Gases and Economies in Transition	1990, but subject to flexibility rules. 1995 or 2000 may be used as the base year for NF_3	1990	1990	1990 for overall emission reduction target; 2005 for renewable energy and energy efficiency target; as well as for targets broken down into ETS and non-ETS emissions		2005		Subject to accounting rules
Aviation	Domestic aviation included. International aviation excluded	Domestic aviation included. International aviation excluded	Aviation in the scope of the EU ETS included	Aviation in the scope of the EU ETS included.	Aviation in the scope of the EU ETS included.	Excluded	Aviation in the scope of the EU ETS included.	Excluded	Not applicable
Use of international credits	Use of KP flexible mechanisms subject to KP rules	Use of KP flexible mechanisms subject to KP rules	Subject to quantitative and qualitative limits	No contribution from international credits	Subject to quantitative and qualitative limits.	Subject to quantitative and qualitative limits.	No contribution from international credits		

	International commitments				EU domestic legislation				
	Kyoto Protocol		UNFCCC	Paris Agreement	2020 Climate and Energy Package		2030 Climate and Energy Framework		
					EU ETS	ESD	EU ETS	ESR	LULUCF
Carry-over of units from preceding periods	Not applicable	Subject to KP rules including those agreed in the Doha Amendment	Not applicable	Not applicable	EU ETS allowances can be banked into subsequent ETS trading periods since the second trading period	No carry-over from previous period	Indefinite validity of allowances not limited to trading periods, no need to catty over.	No	No
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	CO_2, N_2O, CF_4 and C_2F_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, N_2O, CF_4 and C_2F_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O (emissions of HFCs, PFCs, SF_6 do not occur in the sector)

	International commitments				EU domestic legislation				
	Kyoto Protocol		UNFCCC	Paris Agreement	2020 Climate and Energy Package		2030 Climate and Energy Framework		
					EU ETS	ESD	EU ETS	ESR	LULUCF
Sectors included	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CP1	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CP2	Energy, IPPU, agriculture, waste, aviation in the scope of the EU ETS	Energy, IPPU, Agriculture, Waste, LULUCF	Power & heat generation, energy-intensive industry sectors, aviation (Annex 1 of ETS directive)	Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste	As under Climate and Energy Package	As under Climate and Energy Package. [7]	Land-use, land-use change and forestry
GWPs used	IPCC SAR	IPCC AR4	IPCC AR4	IPCC AR4	IPCC AR4				
Sectors included	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CP1	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CP2	Energy, IPPU, agriculture, waste, aviation in the scope of the EU ETS	Energy, IPPU, Agriculture, Waste, LULUCF	Power & heat generation, energy-intensive industry sectors, aviation (Annex 1 of ETS directive)	Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste	As under Climate and Energy Package	As under Climate and Energy Package. [8]	Land-use, land-use change and forestry

[7] The ESR allows the use of land-use credits under certain conditions and up to a total limit over the period 2021-2030 as a flexibility option.

[8] The ESR allows the use of land-use credits under certain conditions and up to a total limit over the period 2021-2030 as a flexibility option.

	International commitments				EU domestic legislation				
	Kyoto Protocol		UNFCCC	Paris Agreement	2020 Climate and Energy Package		2030 Climate and Energy Framework		
					EU ETS	ESD	EU ETS	ESR	LULUCF
GWPs used	IPCC SAR	IPCC AR4	IPCC AR4	IPCC AR4	IPCC AR4				

3.2.2 Accounting for Market-based Mechanisms under the 2020 QEERT target

In general, in the EU the use of flexible mechanisms can take place on the one hand by operators in the EU ETS, on the other hand by governments for the achievement of ESD targets.

The amended EU ETS Directive 2009/29/EC (Article 11a(8)) sets the upper limit for credit use for the period from 2008 to 2020 at a maximum of 50 % of the reduction effort below 2005 levels. This is further specified into installation-level limits in the Commission Regulation on international credit entitlements (RICE) (EU No 1123/2013).[9] Since some entitlements are expressed as a percentage of verified emissions over the entire period, the exact overall maximum amount will only be known at the end of the third trading period (2013-2020). For example, the majority of EU ETS emissions in Greece comes from operators of a stationary installation which have received a free allocation or an entitlement to use international credits in the period from 2008 to 2012. These operators (in case that they have not implement a significant capacity extension) shall be entitled to use international credits during the period 2008 to 2020 up to an amount corresponding to a maximum of 11 % of their allocation in the period from 2008 to 2012. Therefore, these operators are permitted to use up to about 34.7 million carbon credits during the period 2008 to 2020.

Since 2013, it is no longer possible to track the use of flexible mechanisms in the EU ETS directly via information on EUTL public website because CERs and ERUs are no longer surrendered directly but are exchanged into EUAs. These exchanges will become public on an installation level after three years[10]; however aggregated data at EU-level are available at the BR CTF Table 4 of EU.

The ESD allows Member States to make use of flexibility provisions for meeting their annual targets, with certain limitations. In the ESD sectors, the annual use of carbon credits is limited to up to 3 % of each Member State's ESD emissions in 2005. Member States that do not use their 3 % limit for the use of international credits in any specific year can transfer the unused part of their limit to another Member State or bank it for their own use until 2020. Member

[9] The amount of entitlements per installation / aircraft operator can be found at https://ec.europa.eu/clima/ets/ice.do;EUROPA_JSESSIONID=XEfRdZUbkbuF_jMZaZsGFIz0AvkaqZ42N7l7kSansqwTX-IpOW2Z!-869459281

[10] Annex XIV of European Commission. Commission Regulation (EU) No 389/2013. 2013. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013R0389

States fulfilling additional criteria (Austria, Belgium, Cyprus, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, Slovenia, Spain and Sweden) may use credits from projects in Least Developed Countries (LDCs) and Small Island Developing States (SIDS) up to an additional 1 % of their verified emissions in 2005. These credits are not bankable and transferable. Approximately 750 Mt of international credits can be used during the period from 2013 to 2020 in the ESD.

Moreover, higher CDM quality standards apply to the use of CERs for compliance with the EU's target under the Convention.

According to the latest official GHG emission projections of Greece, Greece meets its annual ESD targets without the use of international carbon credits, on the basis of the domestic policies and measures.

3.2.3 Other EU emission reduction targets

In addition to the EU target under the Convention, the EU also committed to a legally binding quantified emission limitation reduction commitment for the second commitment period of the Kyoto Protocol (2013 - 2020). In Table 2 all relevant GHG reduction targets for the EU and their key facts are displayed in an overview. On the left, the table includes the international commitments under the Kyoto Protocol and the UNFCCC. On the right, the EU commitments under the Climate and Energy Package are included.

A further target has been pledged to the Convention through the EU's Nationally Determined Contribution submitted under the Paris Agreement, and has been adopted by the EU under the 2030 Climate and Energy Framework11. The emission reduction target is a pledge to reduce emissions by at least 40% (compared to 1990 levels) by 2030, enabling the EU to move

[11] Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions. A policy framework for climate and energy in the period from 2020 to 2030. /* COM/2014/015 final */. 2014. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014DC0015

towards a low-carbon economy and implement its commitments under the Paris Agreement. In order to achieve this target:

- EU emissions trading system (ETS) sectors will have to cut emissions by 43% (compared to 2005) by 2030. This has been agreed under the Revised EU ETS Directive (2018/410)12.
- Effort Sharing sectors will need to cut emissions by 30% (compared to 2005) by 2030 – this has been translated into individual binding targets for Member States. This has been agreed under the Effort Sharing Regulation (2018/842)13. While the Effort Sharing Regulation does not cover the LULUCF sector as such, it does allows Member States to use up to 280 million credits from the land-use sector over the entire period 2021-2030 to comply with their national targets.
- Emissions and removals from the LULUCF sector are included for the first time in the EU climate target through the so-called LULUCF Regulation (2018/841)14. Each Member State will have to ensure that the LULUCF sector does not create debits, once specific accounting rules are applied. This is known as the "no debit" rule.

Separate targets on renewable energy and energy efficiency had been set under the 2030 Climate and Energy Framework when it was published in 2014. These were updated in 2018

[12] DIRECTIVE (EU) 2018/410 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0410&from=EN

[13] REGULATION (EU) 2018/842 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0842&from=EN

[14] REGULATION (EU) 2018/841 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0841&from=EN

by the Revised Renewable Energy Directive (2018/2001)15 and the amending Energy Efficiency Directive (2018/2002)16. For renewable energy a binding target of at least 32% of final energy consumption by 2030 has been set. With regards to energy efficiency it is a headline target of at least 32.5 % of final energy consumption. Both the renewable energy target and the energy efficiency target include a review clause by 2023 for an upward revision.

Beyond this period and beyond this goal, on 28 November 2018, the European Commission presented and adopted its strategic vision out to 2050. Under the Long Term Strategy (LTS), the European Commission called for a climate-neutral Europe by 2050. The EU expects to adopt and submit an ambitious strategy by early 2020 to the United Nations Framework Convention on Climate Change (UNFCCC) as requested under the Paris Agreement.

4 Progress in achievement of quantified economy-wide emission reduction targets and relevant information

4.1 Mitigation actions and their effects

4.1.1 Overview

This section includes in textual format the following information:

- a short overview of the most important overarching and cross-cutting supporting policies and tools which are related with the implementation of measures for the restriction of GHG emissions in Greece is presented;
- the individual sectoral policies and measures with a direct – quantifiable mitigation effect;
- policies and measures in LULUCF sector.

[15]Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN

[16] Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018L2002&from=EN

The individual sectoral policies and measures with a direct – quantifiable mitigation effect are also presented in **CTF Table 3.**

4.1.2 Overarching and cross-cutting supporting Policies for the restriction of GHG emissions

In this chapter a short overview of the most important overarching and cross-cutting supporting policies and tools which are related with the implementation of measures for the restriction of GHG emissions in Greece is presented. Emphasis is given to the National Energy and Climate Plan, the European Common and Coordinated policies and measures framework, the establishment of emissions trading system since 2005, and the financing mechanisms and fiscal measures that have been developed to support the implementation of projects which inter alia also contribute to the restriction of GHG emissions. The individual sectoral policies and measures with a direct – quantifiable mitigation effect are presented in Section 4.1.3 and CTF Table 3.

4.1.2.1 National Energy and Climate Plan

The National Energy and Climate Plan (NECP), which was recently adopted by Greece (GG 4893 / 31.12,2019), constitutes a strategic plan for the Greek Government on Climate and Energy issues and comprises a detailed roadmap for achieving concrete Energy and Climate Goals by 2030. The NECP presents and analyzes Policy Priorities and Measures in a wide range of economic and development activities for the benefit of Greek society and constitutes the reference text for the next decade.

The NECP highlights our country's energy and climate priorities and development opportunities and aims to be the key tool for shaping/mainstreaming the national energy and climate policy over the next decade, taking into account the recommendations of the European Commission and the UN Sustainable Development Goals (SDGs).

The Government's strategic objective is the energy and climate goals set by the NECP until 2030 to make a decisive contribution to the necessary energy transition in the most economically competitive way for the national economy, to achieve a drastic reduction in greenhouse gas emissions and finally to make our country one of the Member States that has adopted ambitious climate and energy goals through a comprehensive and coherent

programme of measures and policies, putting us at the frontline of Energy Union developments for both 2030 and 2050.

In particular, the NECP as a whole sets significantly more ambitious national energy and climate targets by 2030, both in relation to the original NECP presented in January 2019 and the central European targets and also contributes to the new Green Deal currently promoted by the European Commission.

In particular, by 2030, the NECP provides for:

(a) On climate change and emissions issues, a significantly higher central **target of reducing greenhouse gas emissions**, with a reduction of over 42% in reference to 1990 emissions and over 56% over emissions in reference to 2005, surpassing even the central European targets, while it is worth noting that in the original NECP these targets were significantly lower and resulted to a reduction of 33% and 49% respectively. These new greenhouse gas emission reduction targets are also necessary in order to enable the transition to a climate-neutral economy by 2050, as the Greek Government aims to contribute proportionally to the commitment to a climate-neutral economy at EU level. In parallel with the Climate Mitigation and Adaptation Policies, the NECP sets out the initiatives to be undertaken in the framework of the National Climate Change Adaptation Strategy (NAS) and in line with the NAS general objectives, guiding principles and tools for implementing the necessary climate change measures at national, regional and local level.

Accordingly, the waste management sector is an integral part of the national energy and climate planning and therefore the relevant initiatives for the revision of the National and Regional Waste Management Plans, aiming at the intensification of a series of measures for integrated waste management according to the requirements of circular economy.

Moreover, as Circular Economy is a pivotal element of the country's development strategy, including inter alia a four-year strategic planning that spans the whole value chain, the NECP outlines the pillars of this policy.

(b) Regarding **Renewable Energy Sources (RES)**, a significantly higher target in reference to the share of gross final energy consumption of at least 35% is set, instead of the 31% set in the original NECP and also significantly higher than the central European target for RES of 32%.

It is worth noting of the energy transformation that is anticipated for the electricity sector as the share of RES in electricity consumption is projected to exceed 60% and in this context

specific Government initiatives are already being promoted and implemented such as the simplification and acceleration of the permitting framework, optimizing the integration of RES into the electricity grids, the operation of storage systems, and the promotion of electromobility.

(c) To improve **energy efficiency**, also a significantly more ambitious target than the original NECP is set, which is also higher than the corresponding European target. In particular, it is set as a quantitative objective that the final energy consumption in 2030 is lower than the one recorded in 2017, fully meeting the relevant European indicator of the NECP's ambition measure.
In addition, an energy efficiency improvement of 38% is achieved qualitatively, according to a specific European methodology, where the corresponding central European target amounts to 32.5% and the initial/draft NECP was set at 32%. Achieving this ambitious target will enhance the competitiveness of the Greek economy and consumer protection. NECP describes a set of measures to improve energy efficiency, most prominently in the building and transport sectors.

The flagship goal under the new revised NECP is **the high ambition but also realistic programme for drastically reducing and definitively ceasing lignite's share in power generation until 2028**, i.e. de-lignification, with a front-loaded timing.

This objective also incorporates the government's vision to address environmental issues in the long run, and to streamline the cost of electricity production in our country immediately.

The programme for delignification of domestic electricity generation also provides for the adoption of integrated programmes to support the Greek lignite areas for this transition to the post-lignite period. In particular, the commitment of the Greek Government is to withdraw lignite units by the year 2028 in a coordinated and responsible manner. Securing jobs and leveraging the high-tech know how of the human resources of these areas is a top priority.

In mid-2020, a comprehensive, multidimensional and frontloaded [MasterPlan – Just Development Transition Plan] will be presented which will be the roadmap for development in the post-lignite era. The Greek Government has the political will and know-how to make use of the resources available at national level but also to seek increased funding from European funds and in particular from the Just Transition Fund.

De-lignification is a major breakthrough in the national energy map and at the same time a huge opportunity for the country. The spirit of innovation that has brought the exploitation of

lignite will be imparted into clean forms of energy and the new energy mix of the 21st century.

The NECP also incorporates and describes corresponding measures for other strategic policy priorities such as accelerating the electricity interconnection of islands, operating the new electricity market model without further delays, enhancing energy interconnections and developing strategic storage projects, digitizing energy networks, promoting electromobility, coupling end sectors, as well as research and innovation and competitiveness initiatives demonstrating the Government's holistic approach to planning policies and measures in the areas of Climate and Energy.

4.1.2.2 European common and coordinated policies and measures

The European common and coordinated policies and measures (CCPM) constitute a legislative framework that supports and set the targets of the respective national policies for the restriction of GHG emissions. A list of CCPM is presented in Table 3.

2020 Climate and Energy Package

In January 2008 the European Commission proposed binding legislation to implement the 20-20-20 targets. These targets, known as the "20-20-20" targets, set three key objectives for 2020:

- ✓ A 20% reduction in EU greenhouse gas emissions from 1990 levels. The EU is also offering to increase its emissions reduction to 30% by 2020 if other major economies in the developed and developing worlds commit to undertake their fair share of a global emissions reduction effort;
- ✓ Raising the share of EU energy consumption produced from renewable resources to 20%;
- ✓ A 20% improvement in the EU's energy efficiency.

This ‘2020 climate and energy package’ was agreed by the European Parliament and Council in December 2008 and became law in June 2009. The core of the package comprises four pieces of complementary legislation:

1. A revision and strengthening of the Emissions Trading System (ETS), the EU's key tool for cutting emissions cost-effectively. A single EU-wide cap on emission

allowances will apply from 2013 and will be cut annually, reducing the number of allowances available to businesses to 21% below the 2005 level in 2020. The free allocation of allowances will be progressively replaced by auctioning, and the sectors and gases covered by the system will be somewhat expanded.

2. An 'Effort Sharing Decision' governing emissions from sectors not covered by the EU ETS, such as transport, housing, agriculture and waste. Under the Decision each Member State has agreed to a binding national emissions limitation target for 2020 which reflects its relative wealth. The targets range from an emissions reduction of 20% by the richest Member States to an increase in emissions of 20% by the poorest. These national targets will cut the EU's overall emissions from the non-ETS sectors by 10% by 2020 compared with 2005 levels.
3. Binding national targets for renewable energy which collectively will lift the average renewable share across the EU to 20% by 2020 (more than double the 2006 level of 9.2%). The national targets range from a renewables share of 10% in Malta to 49% in Sweden. The targets will contribute to decreasing the EU's dependence on imported energy and to reducing greenhouse gas emissions.
4. A legal framework to promote the development and safe use of carbon capture and storage (CCS). CCS is a promising family of technologies that capture the carbon dioxide emitted by industrial processes and store it in underground geological formations where it cannot contribute to global warming. Although the different components of CCS are already deployed at commercial scale, the technical and economic viability of its use as an integrated system has yet to be shown. The EU therefore plans to set up a network of CCS demonstration plants by 2015 to test its viability, with the aim of commercial update of CCS by around 2020. Revised EU guidelines on state aid for environmental protection, issued at the same time as the legislative package was proposed, enable governments to provide financial support for CCS pilot plants.

The climate and energy package does not address the energy efficiency target directly. This is being done through the 2011 Energy Efficiency Plan and the Energy Efficiency Directive. On 25 October 2012, the EU adopted the Directive 2012/27/EU on energy efficiency. This Directive establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 20 % headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date. It lays down rules designed to remove barriers in the energy

market and overcome market failures that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets for 2020.

Greece has to report annually on the progress achieved towards national energy efficiency targets. Moreover, by 30 April 2014, and every three years thereafter, Greece has to prepare and submit a National Energy Efficiency Action Plan, which covers significant energy efficiency improvement measures and expected and/ or achieved energy savings, including those in the supply, transmission and distribution of energy as well as energy end-use. Till now, pursuant to 2012/27/EU, but also to End-use Efficiency & Energy Services Directive (2006/32/EC), Greece has submitted four National Energy Efficiency Action Plans in 2007, 2011, 2014 and 2017.

Greek action plans are comprised of horizontal and measures focusing to the residential, tertiary (public and private), non-ETS industry and transport sector. These measures are presented in Table 4.

As a member of the European Union, in compliance with the Directive 2012/27/EU, Greece was required to set a TFC (total final consumption) target for 2020. This target established the basis for energy efficiency policies and measures across the Greek economy. The target set by Greece was 18.4 million tonnes of oil equivalent (Mtoe), which represented a 12% reduction on energy consumption levels in 2005.

A key component of Greece's compliance with the Energy Efficiency Directive is Article 7, in which EU member states are required to ensure that energy savings of 1.5% per year are achieved by energy suppliers and distributors due to the implementation of targeted policy measures. Greece has to achieve cumulative energy savings of 3,332.7 thousand tonnes of oil equivalent (ktoe) by 2020 through the implementation of energy efficiency policy measures, as part of its compliance with the above article. These savings are separate to the economy-wide TFC target.

2030 Climate and Energy Framework

This framework was firstly agreed by EU leaders in October 2014 and changed to be more ambitious in November 2018 by the EU Parliament. It sets the following key targets for the year 2030:

- ✓ At least 40 % cuts in greenhouse gas emissions (from 1990 levels). To achieve this, EU ETS sectors would have to cut emissions by 43 % (compared to 2005), and the

ETS will be reformed and strengthened to achieve this. Non-ETS sectors would need to cut emissions by 30 % (compared to 2005), and this will need to be translated into individual binding targets for Member States

- ✓ 32.5% increase in energy efficiency by 2030
- ✓ Renewables must make up 32% of energy consumed by 2030
- ✓ Push for second-generation biofuels

The framework is in line with the longer-term perspective set out in the Roadmap for moving to a competitive low carbon economy in 2050, the Energy Roadmap 2050 and the Transport White Paper.

The framework will be underpinned by a new and transparent governance process that will ensure the targets outlined above to be met in an effective and coherent manner. This governance process will be based on national plans for competitive, secure, and sustainable energy but will follow a common EU approach.

The European Commission has adopted number of actions to help deliver the framework and the 2030 targets, including a reformed EU ETS, a new Effort Sharing Regulation, and a Regulation to integrate greenhouse gas emissions and removals from land use, land use-change and forestry (LULUCF) into the 2030 climate and energy framework.

Table 3 European common and coordinated policies and measures (CCPM)

CCPM
Cross Cutting Polices and Measures
• The EU Emissions Trading System (2003/87/EC amended by 2009/29/EC) • The Effort Sharing Decision (Decision No 406/2009/EC) • Carbon Capture and Storage Directive (2009/31/EC) • Monitoring Mechanism Regulation (Regulation No 525/2013) • Energy Taxation Directive (2003/96/EC) • Horizon 2020 • European Structural and Investment Funds (ESIF) • National Emissions Ceilings Directive (2016/2284/EU) • Covenant of Mayors for climate and energy • Directive (EU) 2018/410 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments • Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030

Sectoral policies and measures: Energy

- Directive 2009/28/EC on the promotion of the use of energy from renewable sources
- Directive 2010/31/EU on the energy performance of buildings
- Directive 2012/27/EU on energy efficiency
- Directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy- related products
- Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy- related products
- Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU
- Green Public Procurement
- Energy Star Programme
- EU Project Development Assistance (PDA) Facilities
- European Energy Efficiency Fund (EEEF)
- European Regional Development Fund (ERDF)
- Motor Challenge Programme
- Strategic Energy Technology Plan (COM(2007) 723)
- Energy Union Strategy (COM(2015) 80 final)
- Biomass Action Plan
- Communication on Accelerating Clean Energy Innovation (COM(2016) 763 final)
- Communication on Ecodesign Working Plan (COM(2016) 773 final)
- Directive 2018/844/EU on Energy Performance of Buildings
- Directive EU 2018/2001 on Renewable Energy
- Commission Implementing Decision on energy labelling, in support of and as regards: Commission Delegated Regulation (EU) 2015/1186, Commission Regulation (EU) 2015/1188, Commission Regulation (EU) 2015/1185
- EU heating and cooling strategy (COM(2016) 51 final)

Sectoral policies and measures: Transport

- CO2 and Cars Regulation (EC 443/2009)
- CO2 and Vans Regulation (EC 510/2011)
- Strategy for reducing Heavy-Duty Vehicles' fuel consumption and CO2 emissions
- Car and tyre labelling Directives (1999/94/EC and EC 1222/2009 respectively)
- Regulation of Safe motor vehicles and trailers (EC 661/2009)
- Renewable Energy Directive (2009/28/EC)
- Fuel Quality Directive (2009/30/EC)
- Infrastructure charging for heavy goods vehicles (1999/62//EC, amended by 2006/38/EC and 2011/76/EU)
- Directive 2014/94/EU on Deployment of Alternative Fuels Infrastructure
- Clean Vehicles Directive (2009/33/EC)
- Integrating maritime transport emissions in the EU's greenhouse gas reduction policies (COM(2013) 479 final and Regulation (EU) 2015/757)
- White Paper: Roadmap to a Single European Transport Area COM(2011) 144 final
- A European Strategy for Low-Emission Mobility (COM(2016) 501 final)
- Electromobility initiative, Green eMotion
- Fuel Cells and Hydrogen Joint Undertaking (JU)

Sectoral policies and measures: Industry / industrial processes

- Mobile Air Conditioning Systems (MAC) Directive (Directive 2006/40/EC)
- Fluorinated greenhouse gases regulation (Regulation (EU) No 517/2014)
- Industrial Emissions Directive 2010/75/EU (IED)

Sectoral policies and measures: Agriculture and LULUCF

- Common Agricultural Policy / CAP
- Rural Development Policy (2nd pillar of CAP)
- Soil Thematic Strategy (COM(2006) 231)
- Nitrates Directive (91/676/EEC)
- Regulation (EU) 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework

Sectoral policies and measures: Waste

- The Commission adopts its 4th Circular Economy Package (4/3/2019), including an implementation report covering the full Circular Economy Action Plan.
- Directive on Waste (2008/98/EC), as amended by Directive (EU) 2018/851
- Landfill Directive (1999/31/EC) / It was amendment by the Directive (EU) 2018/850
- Management of biodegradable waste (COM/2008/0811 final)
- Urban Waste Water Directive (91/271/EEC)
- Directives on end-of-life vehicles (2000/53/EC), as amended by Directive (EU) 2018/849
- Circular Economy Action Plan
- Motor Vehicles Directive (2005/64/EC)
- Directive on batteries and accumulators and waste batteries and accumulators (2006/66/EC), as amended by Directive (EU) 2018/849
- Directive on waste electrical and electronic equipment (2012/19/EU), as amended by Directive (EU) 2018/849
- Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (Directive 2011/65/EU)
- Packaging and Packaging Waste Directive (Directive 94/62/EC as amended by (EU) 2015/720 and (EU) 2018/852)
- Launch of the Innovation Deals for a circular economy (May 2016)
- Ecodesign Working Plan 2016-2019 (COM(2016) 773 final)
- Establishment of the EU Platform on Food Losses and Food Waste (August 2016)
- Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment

Table 4 Energy Efficiency National Action Plan Measures

Horizontal Measures
H1. Information system for monitoring energy efficiency improvement and achieved energy savings
H2. Programmes to provide financial support for investment in energy-saving technologies and research
H3. Tax exemptions of energy savings interventions
H4. Implementation of an energy management system (EMS) in the tertiary and public sectors
H5. Bioclimatic upgrades of public open spaces
H6. Green rural and island communities - New development model
H7. Energy upgrading of street lighting
H8. Private investment aid scheme for regional and economic development
H9. Energy labelling of appliances and minimum energy efficiency requirements
Residential and Tertiary Private Sector Buildings

R1. Regulation on the Energy Performance of Buildings

R2. 'Saving Energy at Home'

R3. Mandatory installation of solar thermal systems in new residential buildings.

R4. Energy upgrading of social housing buildings- 'Green Pilot Urban Neighbourhood' programme

R5. Compulsory installation of solar thermal systems in tertiary sector buildings

R6. Strengthening SMEs active in manufacturing, tourism and trade - services'.

R7. Regulation on the Energy Performance of Buildings (start in 2017)

R8. 'Saving at home II' programme

R9. Improving the energy efficiency of SMEs

R10. Replacement of oil-fired heating systems with gas-fired ones in residences

Tertiary Public Sector

PS1. Integrated energy planning by local authorities and Covenant of Mayors

PS2. Energy saving interventions in public buildings

PS3. Interventions for improving energy efficiency in school buildings

PS4. Green flat roofs in public buildings

PS5. Compulsory installation of central solar thermal systems to meet hot water requirements

PS6. Compulsory replacement of all low energy efficiency light fittings in the public sector and the wider public sector

PS7. Intelligent Nearly Zero Energy Theme Museums

PS8. Energy managers in public sector and general government buildings

PS9. Energy upgrading of public buildings (start in 2018)

PS10. Holding Fund under the name 'Infrastructure Fund – Projects for the energy upgrade of public buildings

Industry

I1. Relocation of enterprises to industrial-business zones and business parks

I2. Innovative Entrepreneurship, Supply Chain, Food, Beverages

I3. Green Enterprise

I4. Support for improving energy efficiency in manufacturing enterprises

I5. Programme 'Modern manufacturing'

Transport Sector
T1. Reshaping of the public transport system
T2. Transport infrastructure projects
T3. Development of urban mobility plans
T4. Promotion of economical, safe and eco-driving.
T5. Incentives for the replacement of private vehicles and to promote the use of energy-efficient vehicles (vehicles fuelled by natural gas and biofuels and hybrid vehicles)
T6. Eco-labelling – Energy label for cars
T7. Compulsory quotas of vehicles with greater energy efficiency in the fleets of the public services and of public bodies
T8. Linking of vehicle taxation to energy efficiency and CO2 emissions
T9. Replacing old public and private light trucks
T10. Replacing old private passenger vehicles
T11. Promotion of CNG and LPG-powered passenger vehicles
T12. Introduction of electric vehicles and electric vehicle recharging points
Efficient heating and cooling systems
TH1. Installation of high-efficiency cogeneration of heat and power (CHP) systems with natural gas in hospitals
TH2. Installation of CHP systems
TH3. Promotion of efficient district heating systems
TH4. Completion/expansion of infrastructure for the increase of electricity capacity through cogeneration - District heating in the Region of Western Macedonia (Florina, Kozani)
TH5. Promotion of heating and cooling systems from RES and heat cogeneration for self-consumption
TH6 Thermal power generation plants using biomass for the 30 MW district heating network of Amyntaion
TH7. Holding fund under the name 'Infrastructure Fund' - Projects for power production and distribution from RES

4.1.2.3 Emissions trading system

In 2005 the European CO2 emissions trading system (EU-ETS) started operating. It covers a number of industrial and energy sector installations which exceed specific capacity limits set

by Community Directive 2003/87/EC. The major objective of EU-ETS is to help the EU Member States to achieve their obligations in the frame of the Kyoto Protocol in terms of economic efficiency.

In brief, the basic functional characteristics of the emissions trading system include: (a) the determination of a number of emissions allowances which are allocated a priori in the liable installations based on specific rules, while the above mentioned installations are obliged to hand over emissions allowances in annual base equal to the CO2 emissions that emitted in the previous year , (b) the total number of allowances for distribution is lower than the emissions that the indebted installations would emit if the trading system did not exist, so that the created closeness of allowances constitutes an incentive for emissions reductions, (c) in the first and second implementation period (2005-2007 & 2008-2012) the trading of allowances is limited to CO2 and in installations of specific industrial sectors which exceed the predetermined capacity limits (in the future according to Directive 29/2009/EC amending Directive 2003/87/EC the system will include also other gases and sectors), (d) the distribution of emissions allowances is made on the basis of a National allocation plan which is formulated, placed on consultation and is completed before the beginning of the trading period, (e) a strict framework for monitoring and compliance enforcement of the liable installations is put in place which provides for substantial fines in case on non-compliance, and (f) all the transactions of emissions allowances are recorded in national and interconnected community-wide Registries.

In Greece, the trading system for the period 2008-2012 comprises 140 industrial installations (power plants, refineries, cement plants etc.). An allowance reserve is also created which is intended to cover possible unknown new entrants in the period. According to the 2nd National Allocation Plan (NAP), the allowances of CO2 emissions that are to be allocated to installations included in the EU-ETS (including the reserve) were fixed to 341.547.710 t CO2, which requires a considerable decrease of emissions by the enterprises that participate in the system. It is estimated that this decrease of emissions or, with other words, the effect of ETS supporting policy is a 16.7% reduction or 69.2 Mt of CO2 emissions of ETS installations for the period 2008-2012. Since ETS is a supporting policy, the emissions reduction target is implemented by applying other policies and measures as NG use, RES, CHP etc. So, its effect is not additional to the sum of the other policies and measures.

In 2013, the EU ETS moved in its third phase, running from 2013 to 2020. A major revision in order to strengthen the system means the third phase is significantly different from phases

one and two and is based on rules which are far more harmonized than before. The main changes are:

- A single, EU-wide cap on emissions applies in place of the previous system of 27 national caps of each EU Member State;
- Auctioning, not free allocation, is now the default method for allocating allowances. In 2013 more than 40% of allowances will be auctioned, and this share will rise progressively each year. In Greece no free allowances will be allocated to the power sector;
- For those allowances still given away for free, harmonised allocation rules apply which are based on ambitious EU-wide benchmarks of emissions performance. Manufacturing industry will receive 80% of its allowances for free in 2013, a proportion that will decrease in linear fashion each year to 30% in 2020. Sectors facing carbon leakage will receive higher share of free allowances. According to "Benchmarking Decision" 2011/278/EU), installations that meet the benchmarks, i.e. they are among the most efficient in the EU, will in principle receive all the allowances they need. Those that do not reach the benchmarks will receive fewer allowances than they need. These installations will therefore have to reduce their emissions, or buy additional allowances or credits to cover their emissions, or combine these two options. The continued provision of some free allowances limits costs for EU industries in relation to international competitors. Sectors and sub-sectors facing competition from industries outside the EU which are not subject to comparable climate legislation will receive a higher share of free allowances than those which are not at risk of such "carbon leakage."
- Some more sectors and gases are included, as nitrous oxide emissions from the production of certain acids (i.e. nitric, adipic, glyoxal and glyoxylic acids) and emissions of perfluorocarbons from aluminum production.
- Monitoring and reporting: the reform to the EU ETS in Phase III has resulted in important changes with regards to domestic institutional arrangements for the monitoring and reporting of GHG emissions under the EU ETS. EU ETS MRV will be required to comply with two new Commission Regulations from the Phase III of the EU ETS onwards, one specific to monitoring and reporting and the other to verification and accreditation. The latter introduces a framework of rules for the accreditation of verifiers to ensure that the verification of operator's or aircraft operator's reports in the framework of the Union's greenhouse gas emission

allowance trading scheme is carried out by verifiers that possess the technical competence to perform the entrusted task in an independent and impartial manner and in conformity with the requirements and principles set out in this Regulation. These regulations have direct legal effect in the Member States as there is no need to transpose and implement in national legislation since the provisions apply directly to operators or aircraft operators, verifiers, and accreditation parties. The regulations provide clarity on the roles and responsibilities of all parties (i.e. industrial installations and aircraft operators are required to have an approved monitoring plan) which will strengthen the compliance chain.

The European Commission adopted in March 2018 the Directive (EU) 2018/410 in order to revise the EU emissions trading system (EU ETS) for the period after 2020. This is the first step in delivering on the EU's target to reduce greenhouse gas emissions by at least 40% domestically by 2030 in line with the 2030 climate and energy policy framework and as part of its contribution to the Paris Agreement.

To achieve the at least 40% EU target, the sectors covered by the ETS have to reduce their emissions by 43% compared to 2005. To this end, the overall number of emission allowances will decline at an annual rate of 2.2% from 2021 onwards, compared to 1.74% currently. This amounts to an additional emissions reduction in the sectors covered by the ETS of some 556 million tonnes over the decade − equivalent to the annual emissions of the UK.

The Market Stability Reserve (MSR) - the mechanism established by the EU to reduce the surplus of emission allowances in the carbon market and to improve the EU ETS's resilience to future shocks – will be substantially reinforced. Between 2019 and 2023, the amount of allowances put in the reserve will double to 24% of the allowances in circulation. The regular feeding rate of 12% will be restored as of 2024. As a long-term measure to improve the functioning of the EU ETS, and unless otherwise decided in the first review of the MSR in 2021, from 2023 onwards the number of allowances held in the reserve will be limited to the auction volume of the previous year. Holdings above that amount will lose their validity.

The revised EU ETS Directive provides predictable, robust and fair rules to address the risk of carbon leakage. The system of free allocation will be prolonged for another decade and has been revised to focus on sectors at the highest risk of relocating their production outside of the EU. These sectors will receive 100% of their allocation for free. For less exposed sectors, free allocation is foreseen to be phased out after 2026 from a maximum of 30% to 0 at the end of phase 4 (2030). A considerable number of free allowances will be set aside for new and

growing installations. This number consists of allowances that were not allocated from the total amount available for free allocation by the end of phase 3 (2020) and 200 million allowances from the MSR.

More flexible rules have been set to better align the level of free allocation with actual production levels:

- Allocations to individual installations may be adjusted annually to reflect relevant increases and decreases in production. The threshold for adjustments was set at 15% and will be assessed on the basis of a rolling average of two years. To prevent manipulation and abuse of the allocation adjustment system, the Commission may adopt implementing acts to define further arrangements for the adjustments.
- The list of installations covered by the Directive and eligible for free allocation will be updated every 5 years.
- The 54 benchmark values determining the level of free allocation to each installation will be updated twice in phase 4 to avoid windfall profits and reflect technological progress since 2008.

Overall, more than 6 billion allowances are expected to be allocated to industry for free over the period 2021-2030.

Several low-carbon funding mechanisms will be set up to help energy-intensive industrial sectors and the power sector meet the innovation and investment challenges of the transition to a low-carbon economy. These include two new funds:

- The Innovation Fund will support the demonstration of innovative technologies and breakthrough innovation in industry. It will extend existing support under the NER300 programme. The amount of funding available will correspond to the market value of at least 450 million emission allowances.
- The Modernisation Fund will support investments in modernising the power sector and wider energy systems, boosting energy efficiency, and facilitating a just transition in carbon-dependent regions in 10 lower-income Member States.

Aviation under the EU ETS

The aviation sector has been part of the EU ETS since 2012. The original legislation covers all flights in and out of the European Economic Area (EEA). However, for 2012-2016, in order to support the development of a global measure by the International Civil Aviation Organisation (ICAO) for reducing aviation CO2 emissions, the EU provided a derogation

limiting obligations solely to flights within the EEA and to flights within the EEA outermost regions.

In light of the adoption of a Resolution by the 2016 ICAO Assembly on the global measure "Carbon Offsetting and Reduction Scheme for International Aviation" (CORSIA), pending the ICAO's adoption of the relevant CORSIA instruments and subsequent decisions by the EU on the possible implementation of CORSIA in the EU, and to provide continued momentum to the international process, the EU decided in 2017 to extend the current derogation from EU ETS obligations for flights to and from third countries until 31 December 2023, subject to review[17]. The review should consider how to implement the ICAO global measure in Union law through a revision of the EU ETS legislation. The review would take due account of the necessary consistency with EU climate objectives and commitments under the Paris Agreement.

In October 2018, the ICAO Council adopted the Standards and Recommended Practices (SARPs) for CORSIA. As of 1 January 2019, aircraft operators will be required to monitor and report their emissions for CORSIA. To this end, the EU has put in place a legally binding monitoring, reporting and verification (MRV) framework based on the CORSIA SARP and the existing MRV framework under the EU ETS[18].

The inclusion of intra-EEA flights in the EU ETS has delivered around 100 Mt of CO2 reductions between 2012 and 2018[19]. While some reductions are likely to be within the aviation sector, encouraged by the EU ETS's economic incentive for limiting emissions or use of aviation biofuels, the majority of reductions are expected to have occurred in other sectors.[20]

[17] REGULATION (EU) 2017/2392 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 2017 amending Directive 2003/87/EC to continue current limitations of scope for aviation activities and to prepare to implement a global market-based measure from 2021, OJ L 350, 29.12.2017, p. 7.

[18] The EU MRV framework consists of the two implementing acts (Commission implementing regulation (EU) 2018/2066 of 19 December 2018 and Commission implementing regulation (EU) 2018/2067 of 19 December 2018 and a delegated act (Commission Delegated Regulation (EU) 2016/2072 of 22 September 2016).

[19] 1.5% of aviation emissions may be offset by the use of International Credits. Only CP2 CERs from some limited project types may be used

[20] https://ec.europa.eu/clima/policies/ets/allowances/aviation_en

The Innovation Fund, established by and funded through the EU ETS, will also support the aviation sector through funding of innovation projects in low-carbon technologies and processes; the production of e-fuels[21] and synthetic kerosene to replace carbon intensive refinery products; and in the production of e-fuels, hydrogen and synthetic kerosene where these are forms of energy storage.

Marine bunker fuels

Concerning international maritime transport, Greece in line with the European Union has a strong preference for a global approach to reducing GHG emissions from international shipping led by the International Maritime Organization (IMO).

In June 2013, the European Commission adopted a Communication setting out a strategy for progressively including greenhouse gas emissions from maritime transport in the EU's policy for reducing its overall emissions. The strategy consists of the following consecutive steps:

- Establishing a system for monitoring, reporting and verifying (MRV) of CO2 emissions;
- Setting reduction targets for the maritime transport sector;
- Applying further measures, including market-based instruments, in the medium to long term.

Relating to the first of these three steps, large ships over 5,000 gross tonnes loading /unloading cargo/ passengers from 1 January 2018 at EU maritime ports are to monitor and later report their related CO2 emissions and other relevant information in accordance with their monitoring plan.

Monitoring, reporting and verification of information shall be done in conformity with Regulation 2015/757 (as amended by Delegated Regulation 2016/2071). Three other legal acts are also relevant: Delegated Regulation 2016/20172 regarding verification and accreditation activities, Implementing Regulations 2016/1927 on templates and Implementing Regulation 2016/1928 further defining cargo carried for some ship categories. Main obligations can be summarized are as follows:

- By 30 August 2017, MRV companies shall submit to an accredited MRV shipping verifier a monitoring plans using a template corresponding to the model in Annex I of Implementing Regulation (EU) 2016/1927 (for more information see also our FAQs

[21] E-fuels are gaseous and liquid fuels such as hydrogen, methane, synthetic petrol and diesel fuels generated from renewable electricity.

document). Electronic templates will also be developed under THETIS MRV (the dedicated European Union information system currently under development by the European Maritime Safety Agency)

- From 1st January 2018, MRV companies shall monitor for each of their ship CO2 emissions, fuel consumption and other parameters, such as distance travelled, time at sea and cargo carried on a per voyage basis, so as to gather annual data into a Emissions report submitted to an accredited MRV shipping verifier;
- From 2019, by 30 April of each year MRV companies shall submit to the Commission through THETIS MRV (a dedicated European Union information system currently under development by the European Maritime Safety Agency) a satisfactorily verified Emissions report for each of the ships having performed EEA related maritime transport in the previous reporting period (calendar year);
- From 2019, by 30 June of each year MRV companies shall ensure that, all their ships having performed activities in the precedent reporting period and visiting EEA ports, carry on board a document of compliance issued by THETIS MRV. This obligation might be subject to inspections by Member States' authorities.

4.1.2.4 Financing mechanisms

The funding for the support of policies that either straightforward or inter alia contributes in the restriction of GHG emissions is drew from financing mechanisms that in a big extent have been developed in the frame of the Community Support Frameworks.

Information about the financing mechanisms of the programming periods 2000-2006 and 2007-2013 was included in the 6th National Communication. The current funding tools that Greece utilizes are summarized below.

The **Green Fund** is an idea that was implemented by Law 3889/2010 and aims to raise funds for the environment. More specifically, this fund aims to enhance development through environmental protection, enhancement and restoration of the environment, climate change and support of the national environmental policy. The Green Fund introduced the first Programme Guide in October 2011 and the total commitments-absorptions in 2011 amounted to EUR 60 million, while funding programmes of the Green Fund for the year 2012 amounted to EUR 72 million. For the period 2015-2017, funding activities and projects of EUR 142.7 million have been approved and being executed.

LIFE is a financial instrument of the European Union and its main goal is to contribute to the implementation, updating and development of Community environmental policy and legislation, including the integration of the environmental and climate objectives into other policies, thereby contributing to the promotion of sustainable development. Therefore, LIFE finances measures and projects with European added value for the Member States.

The LIFE programme consists of two sub-programmes, one for Environment and one for Climate Action.

Since the launch of the LIFE programme by the European Commission in 1992, a total of 254 projects have been co-financed in Greece. Within the framework of the new LIFE programme, there are some projects on Climate Change which have been funded. The most important of them is the integrated project «LIFE-IP AdaptInGR - Boosting the implementation of adaptation policy across Greece» for adapting Greece to climate change (https://www.adaptivegreece.gr/en-us/). The project aims to catalyse the implementation of the Greek National Adaptation Strategy and of the 13 Regional Adaptation Action Plans at the current 1st adaptation policy cycle (2016-2025) and to prepare the passage to the 2nd adaptation policy cycle (2026+), through appropriate action at national, regional and local levels.

All these projects since 1992 represent a total investment of over €380 million, of which over €210 million has been contributed by the European Union.

There are also two new financial instruments, the Natural Capital Financing Facility (NCFF) and the Private Finance for Energy Efficiency (PF4EE) tool. For details, please visit the LIFE website (ec.europa.eu/life).

The **European Structural and Investment Funds (ESIF)** for the period 2014-2020, on 7-8 February 2013, and based on a Commission proposal, the European Council concluded that climate action objectives will represent at least 20 % of EU spending in the period 2014-2020 and therefore be reflected in the appropriate instruments to ensure that they contribute to strengthen energy security, building a low-carbon, resource-efficient and climate resilient economy that will enhance Europe's competitiveness and create more and greener jobs. The European Structural and Investment Funds (ESIF) comprise:

- The European Regional Development Fund (ERDF) including also the goal on European Territorial Cooperation (ETC);
- The European Social Fund (ESF);
- The Cohesion Fund (CF);

- The European Agricultural Fund for Rural Development (EAFRD);
- The European Maritime and Fisheries Fund (EMFF).

Therefore, 20% of the ESIF funds that Greece will receive for the period 2014-2020 have to be invested in mitigation and adaptation policies and measures, according to the Operational Programmes (OP) that have been prepared for that period.

According to the **PA (Partnership Agreement for the Development Framework)** 2014-2020, which constitutes the main strategic plan for growth in Greece with the contribution of significant resources originating from the European Structural and Investment Funds (ESIF) of the European Union, the following financing priorities have been identified:

1. Enhancing business competitiveness and extroversion, shifting to qualitative entrepreneurship spearheaded by innovation and higher domestic added value

- Transition to high added value activities
- Creation of a business friendly environment to attract investments
- Capitalising on research and innovation to strengthen the competitiveness of new and existing businesses

2. Development and utilisation of human resource abilities – active social inclusion

- Education and life-long learning
- Development of human resources and access to employment focusing on the creation of jobs, especially for young people
- Promotion of social inclusion and combating poverty

3. Protection of the environment – Transition to a more environmentally friendly economy

- Protection of the environment
- Fostering climate change adaptation and risk prevention
- Shift to a low carbon economy

4. Development – modernisation – completion of infrastructures for economic and social growth

- Transport networks focusing on the completion of the Trans-European Transport Networks, with vertical axes and multi-modal transport
- Energy networks
- Broadband networks

5. Improvement of the institutional capacity and the efficiency of public administration and local government

The **Operational Programme for "Transport Infrastructure, Environment and Sustainable Development"** encompasses more than one sector and fund (ERDF and CF) and through these Funds mainly finances core transport and environment infrastructures. A part of the budget pertains to the environment and specifically the Cohesion Fund and is assigned to 13 ROPs, in order to be managed by the Regions for the implementation of mainly liquid waste management projects. The objectives of the Transport Infrastructure, Environment and Sustainable Development 2014-2020 OP with respect to transport consist of promoting the completion of the infrastructure of the core TEN-T (road, rail, ports, airports), promoting combined transport and modernization of the transport system, enhanced road safety, as well as the development of sustainable and ecological urban transport (fixed trajectory urban transport) to enhance sustainable urban mobility. With respect to the environment, it aims to implement important environmental projects and provides compliance to the European Environmental acquis mainly in the sectors of solid waste, waters and waste waters and biodiversity; it focuses on the tackling of climate change and flood risk prevention and management; it undertakes focused actions in reducing environmental pollution and in particular air pollution and noise; and it promotes sustainable urban development and promotes smart energy efficiency projects in public buildings and broader use of teleheating.

The expected impacts of the OP in relation to transport:

- ✓ an additional double railway of 161km on the PATHE-P axis, smaller travel times by road between Athens, Thessaloniki and Patra as well as numerous other road trajectories
- ✓ the reduction of pollution and greenhouse effects via transportation in the major urban areas (Athens: minus more than 95,000 tons of CO2 equivalent, Thessaloniki: minus 67,000 tonnes of CO2 equivalent)
- ✓ a significant increase in the additional serviced population by electrified fixed trajectory public transportation (719,000 in Athens and 580,000 in Thessaloniki)
- ✓ serious reductions in the risk of fatal road accidents
- ✓ a yearly reduction of greenhouse gases due to Metro works by 67,126 tonnes of CO2 equivalent; 14.40km of new lines of Metro in Thessaloniki alone.

Relating to environment:

- ✓ integrated solid waste management throughout the whole waste cycle by increasing the recycling of approximately 650 thousand tonnes per year
- ✓ an increase in the population served by waste water treatment facilities by 661,000 p.e
- ✓ an increase in the protected Natura 2000 areas by 80%
- ✓ a decrease in the annual primary energy consumption of public buildings by 49m kWh/year
- ✓ covering all Greece with flood risk management plans.

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4.1.2.5 Fiscal measures

4.1.2.5.1 Taxation of energy products

Energy taxes are levied within the framework of the 2003 EU Energy Taxation Directive (Directive 2003/96/EC of the Council of 27 October 2003 for restructuring the European Community framework on the taxation of energy products and electricity); the Directive has been transposed into Greek legislation with Law 3336/2005, in combination with the provisions of the National Customs Code (Law 2960/2001). Tax rates are generally significantly higher than the minimum levels prescribed in the Directive.

The following table depicts the current excise duty rates for specified products (Law 4389/2016).

Table 5 Excise duty rates for specified products

Excise duties (euro)		
Energy products	**2017**	**Imposition Unit**
Leaded Petrol	681	1000 lt
Unleaded Petrol	700	1000 lt
Gasoil[22]	410	1000 lt

[22] A winter period is defined (from 15 October to 30 April each year) during which a reduced rate of 280Eur/1,000 lt is applied if used as heating fuel.

Kerosene[23]	670	1000 lt
Heavy fuel oil	38	1000kg
Liquid petroleum gas (LPG) for propellant use	430	1000 kg
Liquid petroleum gas (LPG) as heating fuel[24]	60	1000 kg
Natural gas for propellant use	0	GJ
Natural gas heating fuel for business use[25]	0.3-1.5	GJ
NG heating fuel for households	0.3	GJ
Coal & coke	0.3	gigajoule
Biodiesel	410	1000 lt
Electricity for consumers of high voltage	2.5	MWh
Electricity for households	2.2	MWh
Electricity used for agricultural, horticultural or piscicultural works, and in forestry	0	MWh
Electricity (other)	5	MWh

Fuels used for the purpose of electricity generation are also taxed, with the exception of coal, lignite, coke and natural gas.

4.1.2.5.2 Car registration tax

According to the National Customs Code (Law 2960/2001, Article 121 as amended), motor vehicles for private use which are imported to Greece, in order to be registered and circulate

[23] A winter period is defined (from 15 October to 30 April each year) during which a reduced rate of 280Eur/1,000 lt is applied if used as heating fuel.

[24] Industrial/Commercial use / stationary motors: 120 EURO / 1000kg

[25] Excise duty per yearly consumption as follows: 1.5Euro/GJ for 0-36,000 GJ; 0.45 Euro/GJ for 36,001-360,000GJ; 0.4 Euro/GJ for 360,001-1,800,000GJ; 0.35 Euro/GJ for 1,800,001-3,600,000GJ; 0.3 Euro/GJ for >3,600,000GJ

with Greek plates, are subject to registration tax. The relevant rates are determined on the basis of the taxable price (Table 6), CO2 emissions per km (Table 7) and the anti-pollutant technology of the vehicle. Concerning the antipollution technology of the motor vehicle:

- if it meets the requirements of the preceded by the current valid European Emission Standard (EURO), the registration tax rates of Table 6 are increase by 50%;

- if it does not meet the requirements of both the current and preceded European Emission Standard (EURO), the registration tax rates of Table 6 are increase by 200%;

- if it does not meet the requirements of European Emission Standard (EURO) and there is no legal proof of the emissions of carbon dioxide, the registration tax rates of Table 6 are increase by 500%.

Hybrid cars are subject to 50% of the registration tax, while electric cars are not subject to registration tax..

Table 6 Registration tax rates

Taxable price (Euros)	**Registration tax rate**
Up to 14,000	5%
14,000-17,000	8%
17,000-20,000	16%
20,000-25,000	24%
25,000 and above	32%

Table 7 Modification of registration tax rates according to CO2 emissions

CO2 emissions (g/km)	**Modification of rate**
Up to 100	decrease by 5%
120-140	increase by 10%
140-160	increase by 20%
160-180	increase by 30%
180-200	increase by 40%

200-250	increase by 60%
250 and above	increase by 100%

4.1.2.5.3 Motor vehicle circulation fee (road tax)

Owners of motor vehicles and motorcycles using public roads are subject to an annual road tax, paid one-off every year from 1 November until 31 December in advance for next year. The vignette (sticker) was abolished since 2013 (Law 4093/2012). Tax rates, tax base and reliefs are determined by the Ministry of Finance. Motor vehicles are categorized to vehicles for private and public use and within each category to passenger cars, lorries and trucks, buses, trailers and other vehicles. The tax assessment basis is cylinder capacity for private cars, gross weight for lorries and number of passenger seats for buses.

Currently, the road tax for private cars is specified on the basis on the cylinder capacity (cc) for cars that have registered in Greece before 31/10/2010; and on the CO2 emissions for cars registered afterwards.

Table 8 Road tax for cars registered till 2000

Category	Engine size (cc)	Annual road tax (euros)
A	Up to 300	22
B	301-785	55
Γ	786-1071	120
Δ	1072-1357	135
E	1358-1548	225
ΣΤ	1549-1738	250
Z	1739-1928	280
H	1929-2357	615
Θ	2358-3000	820
I	3001-4000	1025
K	4001 and above	1230

Table 9 Road tax for cars registered during 2001-2005

Category	Engine size (cc)	Annual road tax (euros)
A	Up to 300	22
B	301-785	55
Γ	786-1071	120
Δ	1072-1357	135
E	1358-1548	240
ΣΤ	1549-1738	265
Z	1739-1928	300
H	1929-2357	630
Θ	2358-3000	840
I	3001-4000	1050
K	4001 and above	1260

Table 10 Road tax for cars registered during 2006-31.10.2010

Category	Engine size (cc)	Annual road tax (euros)
A	Up to 300	22
B	301-785	55
Γ	786-1071	120
Δ	1072-1357	135
E	1358-1548	255
ΣΤ	1549-1738	280
Z	1739-1928	320
H	1929-2357	690
Θ	2358-3000	920
I	3001-4000	1150
K	4001 and above	1380

Table 11 Road tax for cars registered after 1.11.2010

CO2 emissions (gCO2/km)	Annual road tax per gCO2 (euros)
0-90	0
91-100	0.90
101-120	0.98
121-140	1.20
141-160	1.85
161-180	2.45
181-200	2.78
201-250	3.05
251 and above	3.72

Hybrid cars up to 1,549 cc are exempt from road tax. Hybrid cars with a cylinder capacity more than 1,549 cc, are subject to the 60% of the road tax corresponding to a car of conventional technology.

4.1.2.5.4 Corporate income taxation

The revenues of the enterprises that operate after approval by the Ministry of Environment and Energy, as an "Alternative Management System", which remain after the deduction of the statutory reserve and its reduction to a gross amount with the addition of the corresponding income tax, are exempt from income tax. As “Alternative Management System" is defined the organization on an individual or collective basis of any legal form of the collection works, including the warranty, transport, re-use and treatment of used packaging or packaging waste and other products {wastes from electrical and electronic equipment (WEEE), End-of-Life vehicles (ELVs), used tires, waste oils, waste batteries & accumulators, construction and demolition wastes}.

Moreover, the revenues from the sale of electric energy to PPC or other suppliers of electricity, which is produced by households or small business, after their inclusion in the "Special Programme for the Development of Photovoltaic Systems up to ten (10) kw", are exempt from taxation.

Moreover, all renewable energy source technologies are eligible for tax incentives. According to the new development law (4399/2016), investment subsidies will be granted to small hydro plants (up to 15 MW), high-efficiency co-generation plants using renewable energy sources,

hybrid renewable energy source plants in the non-interconnected islands (up to 5 MW), production of heating and cooling from renewable energy sources, and high-efficiency district heating and cooling.

4.1.2.6 Local authorities contribution to mitigation of climate change adverse effects

Local authorities have a key role in mitigating climate change, since:

- Over half of greenhouse gas emissions are created in and by cities.
- 80% of the population lives and works in cities, where up to 80% of energy is consumed.
- Local authorities, being the closest administration to the citizens are ideally positioned to understand their concerns.

For that reason, the European Commission commenced an ambitious initiative and/or voluntary effort, named "The Covenant of Mayors", which gives the lead to Europe's pioneering cities to mitigate climate change through the implementation of intelligent local sustainable energy policies that create stable local jobs, increase citizens' quality of life and address crucial social issues. The Covenant of Mayors constitutes a formal commitment to go beyond the EU objectives in terms of CO2 reduction, through the implementation of sustainable energy action plans with concrete measures.

Signatories to the Covenant commit to submitting their local Sustainable Energy Action Plans (SEAPs) within the year following adhesion. These cities are then expected to provide periodic public reports outlining the progress of their Action Plans. Cities also commit to allocating sufficient human resources to the tasks, mobilising society in their geographical areas to take part in the implementation of the action plan, including organisation of local energy days, and networking with other cities.

More information about the "The Covenant of Mayors" can be found at the link: http://www.eumayors.eu/. As concerns Greece, till now more than 100 greek cities (among others Aigaleo, Ios, Kea, Korthi, Lamia, Likovrisi, Lipsi, Milos, Moudros, Nisyros, Oia, Patras, Poseidonia, Ptolemaida, Serres, Skyros, Sykies, Thermi, Trikala) and 1 supporting network of cities (Network of Aegean Islands for Sustainability, DAFNI) have joined the Covenant.

The mitigation actions of climate change that are planned and executed at a local authority level comprise of:

- Traffic studies and reorganization of public transport (use of environment friendly vehicles, etc.).
- Incorporation of RES projects in regional development plans. Introduction of RES systems in public buildings and/or installations running by local authorities. Use of photovoltaic lights for municipal lighting.
- Close co-operation with NGOs as WWF, Greenpeace, etc. in order to raise public awareness.
- Replacement of conventional lamps with energy efficient ones in public buildings.
- Use of eco-friendly paints and solvents.
- Implementation of infrastructure projects and interventions in order to improve energy efficiency in desalination plants and other installations running by local authorities (e.g. reduce consumption of reactive power, energy recovery by turbines installation etc.).
- Use of tertiary treatment in waste water treatment plants and re-use of effluent for irrigation of croplands instead of using water from desalination plants.
- Wastewater treatment by applying non energy intensive systems as photocatalytic methods and aquatic plants.
- Implementation of composting programmes for household organic wastes.
- Implementation of production and distribution programmes of drinking water at regions where water is in scarcity (mainly islands), in order to reduce the consumption of bottled water.
- Implementation of rainwater collection programmes at areas where tap water is produced by desalination plants.
- Recycling of electric appliances, batteries, wires, waste oils and packaging materials.

4.1.3 Sectoral mitigation actions

4.1.3.1 Overview

This chapter presents quantitative estimates of the expected effects of implemented and adopted policies and measures in Greece under the Convention (UNFCCC), aiming at reducing GHG emissions in order to meet the Kyoto Protocol targets, along with the targets set by the CC&E package and EC directives. These policies and measures were adopted in the context of the National Action Plans of the above mentioned directives and the main targets

of the National Energy Strategy, with respect to their emissions reduction potential and economic efficiency. Moreover, it presents the planned policies and measures that were reflected in the “with additional measures” projections scenario. The planned policies are the additional policies in order to comply with the targets set in the National Energy and Climate Plan of Greece, which was adopted in December 2019 (see section 4.1.2.1).

Table 12 and

Table 13 present estimates of the expected effects of these policies and measures in the time horizon of the years up to 2030. An ex-post estimation of the effect of policies for year 2015 is also included.

The total realistic quantifiable GHG emissions reduction potential from the implemented and adopted policies and measures was estimated to be 33.1Mt CO2eq for 2020 (26.4 Mt under EU-ETS and 6.7 Mt under ESD sectors); and 40.0Mt CO2eq for 2030 (29.8 Mt under EU-ETS and 10.2 Mt under ESD sectors).

The possible interferences between these implemented/adopted measures, which may restrict the estimated GHG emissions reduction potential, were taken into account. Thus, it is obvious that the application of the already implemented and adopted measures for the mitigation of GHG emissions contributes considerably in the restriction of the augmentative trend of emissions (besides the economic recession), leading to the achievement of the Kyoto Protocol objectives and the 2020 targets pursuant to European Union obligations, exclusively with domestic measures and actions (see chapter 5).

The mitigation effect of each policy is estimated by comparing the 'with measures' scenario with a hypothetical baseline scenario that does not include the mitigation effect of the examined policy or measure. The same approach as that used in NC7 and/or BR3 has been followed for the estimation of the mitigation effect of the policies. Any change of the mitigation effect of the policies compared to previous submission is attributed to a change of the WM scenario.

Table 14 and Table 15 present estimates of the expected effects of planned policies, which are the additional policies in order to comply with the targets set in the National Energy and Climate Plan of Greece.

The total realistic quantifiable GHG emissions reduction potential from the planned policies and measures was estimated to be 16.7Mt CO2eq in 2030 (11.8 Mt under EU-ETS and 4.9 Mt under ESD sectors).

The individual sectoral policies and measures with a direct – quantifiable mitigation effect are also presented in **CTF Table 3**.

Table 12 Effects of implemented / adopted policies and measures (included in the "with measures" scenario)

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Start year	Implementing entity or entities	Ex-post mitigation effect (ktCO2eq) Year 2015	Mitigation impact (ktCO2 eq) Year 2020	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
1	Improvements in the conventional power generation system	Energy	CO2	Efficiency improvement in the energy and transformation sector (Energy supply); Switch to less carbon-intensive fuels (Energy supply)	Economic, Regulatory	Implemented	1996	Public Power Corporation S.A. (Companies) ; Ministry of Environment and Energy (Government)	7400	15,000	13,300	10,400
2	Promotion of natural gas in residential sector	Energy	CO2	Efficiency improvements of buildings (Energy consumption)	Economic, Regulatory, Fiscal, Information	Implemented	1998	Ministry of Environment and Energy (Government)	260	320	390	475
3	Promotion of natural gas in tertiary sector	Energy	CO2	Efficiency improvement in services/ tertiary sector (Energy consumption); Demand management/reduction (Energy consumption)	Economic, Regulatory, Fiscal, Information	Implemented	1998	Ministry of Environment and Energy (Government)	120	140	170	210
4	Promotion of natural gas in industry	Energy	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Economic, Regulatory, Information	Implemented	1996	Ministry of Environment and Energy (Government)	638	814	832	970
5	Promotion of natural gas in transportation	Transport	CO2	Low carbon fuels/electric cars (Transport)	Economic, Regulatory, Fiscal	Implemented	1999	Ministry of Environment and Energy (Government) ;	11	18	22	44

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Start year	Implementing entity or entities	Ex-post mitigation effect (ktCO2eq) Year 2015	Mitigation impact (ktCO2 eq) Year 2020	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
								Ministry of Infrastructure and Transport (Government)				
6	Promotion of RES for electricity generation	Energy	CO2	Increase in renewable energy (Energy supply)	Economic, Fiscal, Regulatory	Implemented	1994	Ministry of Environment and Energy (Government) ; Regulatory Authority for Energy (Other)	14,700	11,000	14,500	19,000
7	Biofuel use in transportation	Transport	CO2	Low carbon fuels/electric cars (Transport)	Fiscal, Regulatory	Implemented	2005	Ministry of Environment and Energy (Government) ; Ministry of Infrastructure end Transport (Government)	490	650	680	700
8	Implementation of energy efficiency measures in Industry (National Energy Efficiency Action Plan)	Energy, Industry/ industrial processes	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Economic, Fiscal, Regulatory, Information	Implemented	2008	Ministry of Environment and Energy (Government)	NE	200	200	200
9	Implementation of energy efficiency measures in Residential and	Energy	CO2	Efficiency improvements of buildings (Energy consumption);	Economic, Fiscal, Regulatory,	Implemented	2008	Ministry of Environment and Energy	180	2,200	2,300	2,400

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Start year	Implementing entity or entities	Ex-post mitigation effect (ktCO2eq) Year 2015	Mitigation impact (ktCO2 eq) Year 2020	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
	Tertiary Sector (National Energy Efficiency Action Plan)			Efficiency improvement in services/ tertiary sector (Energy consumption); Efficiency improvement of appliances (Energy consumption)	Information			(Government)				
10	Road transport measures	Transport	CO2, CH4, N2O	Efficiency improvements of vehicles (Transport); Modal shift to public transport or non-motorized transport (Transport); Improved transport infrastructure (Transport); Low carbon fuels/electric cars (Transport)	Economic, Fiscal, Regulatory	Implemented	1983	Ministry of Environment and Energy (Government) ; Ministry of Infrastructure and Transport (Government)	300	560	600	650
11	Recovery of organic waste	Waste management /waste	CH4	Reduced landfilling (Waste); Enhanced recycling (Waste); Improved landfill management (Waste)	Regulatory, Other (Other (Planning)	Implemented	2002	Ministry of Environment and Energy (Government)	480	500	900	1300
12	Recovery of biogas	Waste management/waste	CH4	Enhanced CH4 collection and use (Waste)	Regulatory, Other (Other (Planning)	Implemented	2002	Ministry of Environment and Energy (Government)	700	500	600	700

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Start year	Implementing entity or entities	Ex-post mitigation effect (ktCO2eq) Year 2015	Mitigation impact (ktCO2 eq) Year 2020	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
13	Reduction of emissions of fluorinated gases	Industry/industrial processes	HFCs, PFCs	Reduction of emissions of fluorinated gases (Industrial processes); Replacement of fluorinated gases by other substances (Industrial processes)	Regulatory, Information	Implemented	2004	Ministry of Environment and Energy (Government)	NA	460	1400	2300
14	Establishing common rules for direct support schemes under the common agricultural policy: Reduction of the rate of intensity of agricultural land use and improvement of management of animal waste	Agriculture	CH4, N2O	Other activities improving cropland management (Agriculture); Improved livestock management (Agriculture); Improved animal waste management systems (Agriculture); Sustainable development of agricultural activities and rural areas, with a focus on climate change mitigation and adaptation objectives. (Other agriculture)	Other (Other (Planning), Regulatory, Economic	Implemented	2007	Ministry of Rural Development and Food (Government)	300	375	550	750
15	Rural Development Programme (RDP): Increase of organic farming.	Agriculture	N2O	Improved management of organic soils (Agriculture); Reduction of fertilizer/manure use on cropland	Other (Other (Planning), Economic	Implemented	2007	Ministry of Rural Development and Food (Government)	160	220	300	350

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Start year	Implementing entity or entities	Ex-post mitigation effect (ktCO2eq) Year 2015	Mitigation impact (ktCO2 eq) Year 2020	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
				(Agriculture)								
16	Common Agricultural Policy (CAP) – Reduction in fertilizers use.	Agriculture	N2O	Reduction of fertilizer/manure use on cropland (Agriculture)	Other (Other (Planning), Regulatory, Economic	Implemented	2007	Ministry of Rural Development and Food (Government)	100	120	150	200
17	Measures in the LULUCF sector	Forestry/LULUCF	CO2, CH4, N2O	Measures for LULUCF sector arisen from Public Investment Program, Regular Budget (Special Body Φ 31-130 "Forest Services"), Special Body of Forests (Green Fund), Operational Program "Transport infrastructure, environment & sustainable development" 2014-2020, Rural Development Program 2014-2020 and other financial mechanisms.	Other (Other (Planning)	Implemented		Ministry of Environment and Energy	NE	NE	NE	NE

Table 13 Brief description of implemented / adopted policies and measures (included in the "with measures" scenario)

P&M No	Name of mitigation action	Brief description
1	Improvements in the conventional power generation system	The main implemented / adopted measures for the improvement of the conventional power generation system are: - The gradual decommissioning of old inefficient and more pollutant thermal power units. - The commissioning of new power units that follows BAT and the new IED. - The increase of NG share in electricity production. - The interconnection of certain islands with the mainland grid.
2	Promotion of natural gas in residential sector	The introduction of natural gas in the national energy system is one of the largest investments ever carried out in Greece and it constitutes a major priority of the national energy policy. An important part of the infrastructure, mainly the high pressure transmission system and the medium pressure network, which is necessary for the transport of natural gas to the main regions of consumption, has been completed, while the networks' development in the cities is ongoing. Expansion projects of Greek natural gas system are under way in order to link more cities and industries to the system. The residential and commercial sectors account for small but growing shares of total gas consumption. Following a drop between 2011 and 2013, gas consumption increased in these sectors to new record levels in 2015, accounting for one-fifth of the total gas consumption. However, natural gas represents only 8% of the total energy consumption in the residential and commercial sectors. The actions for the promotion of NG are summarized to the following bullets: (a) Fiscal measures; (b) Pricing (always lower price than the competitive liquid fuels, valid for all sectors); (c) Discount on connection fees; (e) Heavy marketing through TV commercial, ads, etc., focusing on the increased efficiency, economy and environmental "friendliness" of natural gas; (f) Availability of natural gas through continuous development of networks (infrastructure); (g) Liberalization of electricity and natural gas markets.
3	Promotion of natural gas in tertiary sector	The introduction of natural gas in the national energy system is one of the largest investments ever carried out in Greece and it constitutes a major priority of the national energy policy. An important part of the infrastructure, mainly the high pressure transmission system and the medium pressure network, which is necessary for the transport of natural gas to the main regions of consumption, has been completed, while the networks' development in the cities is ongoing. Expansion projects of Greek natural gas system are under way in order to link more cities and industries to the system. The residential and commercial sectors account for small but growing shares of total gas consumption. Following a drop between 2011 and 2013, gas consumption increased in these sectors to new record levels in 2015, accounting for one-fifth of the total gas consumption. However, natural gas represents only 8% of the total energy consumption in the residential and commercial sectors. The actions for the promotion of NG are summarized to the following bullets: (a) Fiscal measures; (b) Pricing (always lower price than the competitive liquid fuels, valid for all sectors); (c) Discount on connection fees; (e) Heavy marketing through TV commercial, ads, etc., focusing on the increased efficiency, economy and environmental "friendliness" of natural gas; (f) Availability of natural gas through continuous development of networks (infrastructure); (g) Liberalization of electricity and natural gas markets.

P&M No	Name of mitigation action	Brief description
4	Promotion of natural gas in industry	The introduction of natural gas in the national energy system is one of the largest investments ever carried out in Greece and it constitutes a major priority of the national energy policy. An important part of the infrastructure, mainly the high pressure transmission system and the medium pressure network, which is necessary for the transport of natural gas to the main regions of consumption, has been completed. Hundreds of industrial plants use natural gas covering efficiently their energy needs. Expansion projects of Greek natural gas system are under way in order to link more industries to the system. The industry sector is the second-largest consumer of natural gas, accounting for 29% of the total gas demand in 2015. This includes natural gas used as petrochemical feedstock in the chemical and petrochemical industry, which represents almost half of industrial gas consumption. The non-ferrous metals industry (e.g. aluminium) is the largest consumer of natural gas for energy purposes in the industry sector, accounting for nearly one-third of the total gas consumption in industry. The actions for the promotion of NG are summarized to the following bullets: (a) Pricing (always lower price than the competitive liquid fuels, valid for all sectors); (b) Discount on connection fees; (c) Heavy marketing through TV commercial, ads, etc., focusing on the increased efficiency, economy and environmental "friendliness" of natural gas; (d) Availability of natural gas through continuous development of networks (infrastructure); (e) Liberalization of electricity and natural gas markets; (f) Emission Trading System; (g) Restriction of environmental permits to industrial installations (e.g. prohibition of petcoke use by the ceramics production units).
5	Promotion of natural gas in transportation	A significant of public transportation buses and municipality garbage collection vehicles already use natural gas as fuel, followed by cars of dual-fuel or bi-fuel technology. Apart from the public vehicles (e.g. buses) there are incentives for the replacement of private vehicles and to promote the use of energy-efficient vehicles (vehicles fueled by natural gas and bio-fuels and hybrid vehicles).
6	Promotion of RES for electricity generation	The start year for the policies aiming for the promotion of RES for electricity generation is 1994, when the OPE (Operational Programme Energy within the 2nd Community Support Framework, 1994-1999) and the provisions of the National Development Assistance Act providing investment cost subsidies in combination with Law 2244/94, which specifies favourable buy-back tariffs for electricity generated from renewable energies. Greece developed its policy framework under the European Union (EU) Renewable Energy Directive (Directive 2009/28/EC), which set out an overall binding national target for Greece of 18% of renewable energy sources in gross final energy consumption for 2020. Greece set the following indicative sector targets according to the national renewable energy action plan (NREAP, time frame 2010-2020) for the contribution of renewable energy source to: - gross final energy consumption for heating and cooling: at least 20% - gross final electricity consumption: at least 40% - gross final energy consumption in transportation: at least 10%.
7	Biofuel use in transportation	In 2005, Law L3054/2002 "Organization of the oil market and other provisions" was amended to include biofuels in the existing legal framework for oil products. The new Law, L3423/2005 "Introduction of biofuels and other renewable fuels in the Greek market" (O.G. A' 304/13.12.2005) transposed Directive 2003/30/EC in the Greek legal system and provided for the introduction of biofuels into the oil market. In order to increase the use of biofuels according to Law 3340/2005 the excise tax for these biofuels was null for the years 2005, 2006 and 2007. Since December 2005 pure biodiesel is blended (according to EN 590:2004) by the 4 Greek oil refineries in diesel used in transport up to 5% by volume. By decision 460/2009 (O.G. B' 67/28.01.2010) of the State Chemical Council (SCC) the EN 590:2009 standard was adopted formally and the

P&M No	Name of mitigation action	Brief description
		maximum biodiesel percentage was increased to 7%. According to the provisions of Law 3054/2002, a specific quantity of pure biodiesel is allocated to beneficiaries to achieve the 7% mandatory percentage of biodiesel blended in diesel (per volume). Similarly, the obligation to blend petrol with bioethanol to 1% for the year 2019 and 3.3% in 2020 to 5% by volume of energy was introduced, while there is the possibility of increasing this percentage after 2020.
8	Implementation of energy efficiency measures in Industry (National Energy Efficiency Action Plan)	Energy-efficiency improvements and CHP units in various areas of the industry sector have been promoted since the 1st National Climate Change Program through the provisions of the Development Assistance Acts, Law 2244/93 (for CHP plants), the OPE (Measures 2.2 and 2.3) and OPC: - energy saving interventions (installing building envelope insulation, heat insulated window frames, energy class A air-conditioning units, energy saving light bulbs, high-efficiency burners and boilers, exhaust heat recovery, etc.); - developing and implementing systems for the recovery/saving and/or substitution of conventional energy and water in the production process; - the procurement costs of equipment for energy self-production from RES and substitution of fuels with natural gas or LPG; - bioclimatic and small-scale building interventions to save energy/heat/water; - conducting energy audits and benchmarking; - streamlining of equipment, upgrade of facilities and installation of new energy efficient technologies; - education and training of staff.
9	Implementation of energy efficiency measures in Residential and Tertiary Sector (National Energy Efficiency Action Plan)	Several actions are included in the Energy Efficiency National Action Plans concerning the conservation and rational use of energy in the residential and tertiary sector. Apart from the introduction of natural gas and RES, the measures concern actions for the improvement of the thermal behavior of residential sector buildings and promotion of energy efficiency appliances and heating equipment. These actions are supported significantly by the incorporation in the Greek legislation of the Directive 2002/91/EC by Law 3661/08 “Measures to reduce the energy consumption of buildings”; the Law 4122/2013 “Energy performance of buildings” (transposition of Directive 2010/31/EE); the Law 3855/2010 “Measures to improve energy efficiency in end-use, energy services and other provisions” (transposition of Directive 2006/32/EC); the adoption and application of the “Energy Performance of Buildings Regulation” (KENAK); and the transposition to the Greek legislation of European Directive 27/2012/EU by Law 4342/2015.
10	Road transport measures	GHG emissions from the transport sector present a declining trend mainly due to economic crisis. Nevertheless they are still considerable both in Greece and in European Union, and, consequently the implementation of suitable policies and restriction measures is required. The main axes of intervention and implemented policies and measures in the sector, beyond the introduction of biofuels for road transport and natural gas in the public system of transport that were already described previously, are: (A) Interventions in the transport system; (B) Interventions in public transport; (C) Interventions in vehicles;

P&M No	Name of mitigation action	Brief description
		(D) Measures for addressing air pollution from road traffic in urban centres; and (E) Fiscal measures. The mitigation of transport GHG emissions is also supported by EU transport sector policies: (a) The CO2 and Cars Regulation (EC) No 443/2009; (b) The CO2 and Vans Regulation (EU) No 510/2011; (c) The Directive 1999/94/EC on Car Labelling ; (d) The Regulations that are in place related to environmental and safety requirements of tyres and gear shift indicators (GSI); (e) Directive 2009/30/EC on Fuel Quality ; and (f) Directive 2014/94/EU on Deployment of Alternative Fuels Infrastructure.
11	Recovery of organic waste	Reduction of the quantities of biodegradable wastes landfilled through the installation of solid waste treatment facilities. Acc. to Directive (EU) 2018/850 for the amendment of Directive 1999/31 / EC on the landfill of waste, it is targeted only the 10% of generated municipal solid waste to be landfilled by 2035. Promotion of measures for separate collection of biowaste, recycling, energy recovery and use of sludge in agriculture as fertilizer/compost.
12	Recovery of biogas	Collection and flaring / energy use systems of landfill gas are being installed in all managed sites for urban centres with population more than 100,000. Already, the managed disposal sites serving the population of the largest cities of Greece are equipped with systems for the collection or for the flaring of biogas. In the Psyttalia wastewater treatment plant that serves approximately 4 millions of Attica population, a part the sludge produced is treated under anaerobic conditions resulting in the production of biogas. The biogas produced covers the energy needs of the wastewater treatment facilities.
13	Reduction of emissions of fluorinated gases	To control emissions from fluorinated greenhouse gases (F-gases), including hydrofluorocarbons (HFCs), the European Union has adopted two legislative acts: the 'MAC Directive' (2006/40/EC) on air conditioning systems used in small motor vehicles, and the 'F-gas Regulation' (No 517/2014) which covers all other key applications in which F-gases are used. The two strategies described in the abovementioned regulation to reduce emissions is to prevent leakage and emissions {Emission prevention and leak checks, Control of by-production, End of life treatment of products and equipment, Training and qualification, Information for users (labelling, product info)} and control of use of F-gases (Ban on new applications, Ban on uses, Phase-down of HFC supply). Several control mechanisms and penalties are implemented in Greece. Checks for compliance with these regulations of the European Union are carried out by the relevant bodies and agencies of the competent authorities, as appropriate, in the context of their remit. In cases of infringement of the provisions of the relevant EU Regulations by legal or natural entities of the public and private sector, sanctions are imposed by the relevant bodies and agencies of competent authorities. It is considered that the action taken by the EU and its Member States under the F-gas Regulation will enable the EU to comply with the Kigali amendment to the Montreal Protocol on a global phase-down of hydrofluorocarbons (HFCs).

P&M No	Name of mitigation action	Brief description
14	Common Agricultural Policy (CAP) – Green Direct Payments: reduction of the rate of intensity of agricultural land use and improvement of management of animal waste.	The reduction of the rate of intensity of agricultural land use and the adoption of rules for the obligatory observance of cross compliance system relating to manure management contribute to the reduction of GHGs. Moreover, the disengagement of subsidies from the agricultural production has already enhanced indirectly the reduction of agricultural production and livestock population. In fact, the disengagement of subsidies from the agricultural production along with the enhanced citified way of life consist the main reasons for the reduction of agricultural production.
15	Rural Development Programme (RDP): Increase of organic farming.	Measures and incentives in order to increase the organic farming. Organic production results in a substantial decrease of N2O emissions. According to national statistics, the total land with organic farming in Greece (fully converted and under conversion to organic farming) is 342,584 ha in 2016. The actions of Rural Development Program (2014-2020) for the transition to practices and methods of organic farming will cover 478,317.70 ha of land, while the aid to preserve existing organic farming practices and methods will cover 241,804 ha.
16	Common Agricultural Policy (CAP) – Green Direct Payments: Reduction in fertilizers use	Decrease of the use of synthetic nitrogen fertilizer and protection of the groundwater, resulting in a substantial decrease of N2O emissions.
17	Measures in the LULUCF sector	Forest protection, Forest management, Ecosystem health, Research, Restoration – increase of forest lands, Adaptation.

Table 14 Effects of planned policies and measures (included in the "with additional measures" scenario)

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Implementing entity or entities	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
18	Further promotion of RES for electricity generation	Energy	CO2	Increase in renewable energy (Energy supply)	Economic, Fiscal, Regulatory	Planned	Ministry of Environment and Energy (Government) ; Regulatory Authority for Energy (Other)	8,323	11,792
19	Further biofuel use in transportation	Transport	CO2	Low carbon fuels/electric cars (Transport)	Fiscal, Regulatory	Planned	Ministry of Environment and Energy (Government) ; Ministry of Infrastructure end Transport (Government)	100	429
20	Further promotion of natural gas and energy efficiency in industry	Energy, Industry/industrial processes	CO2	Efficiency improvement in industrial end-use sectors (Energy consumption)	Economic, Fiscal, Regulatory , Information	Planned	Ministry of Environment and Energy (Government)	764	1276
21	Further promotion of natural gas in residential and tertiary sectors and implementation of additional energy efficiency measures in Residential and Tertiary Sector (NECP)	Energy	CO2	Efficiency improvements of buildings (Energy consumption); Efficiency improvement in services/ tertiary	Economic, Fiscal, Regulatory , Information	Planned	Ministry of Environment and Energy (Government)	2270	2990

PaM No	Name of mitigation action	Sectors affected	GHGs affected	Objective and/or activity affected	Type of instrument	Status	Implementing entity or entities	Mitigation impact (ktCO2 eq) Year 2025	Mitigation impact (ktCO2 eq) Year 2030
				sector (Energy consumption); Efficiency improvement of appliances (Energy consumption)					
22	Road transport measures (additional measures as included in NECP and NTSP)	Transport	CO2, CH4, N2O	Efficiency improvements of vehicles (Transport); Modal shift to public transport or non-motorized transport (Transport); Improved transport infrastructure (Transport); Low carbon fuels/electric cars (Transport)	Economic, Fiscal, Regulatory	Planned	Ministry of Environment and Energy (Government) ; Ministry of Infrastructure and Transport (Government)	46	190

Table 15 Brief description of planned policies and measures (included in the "with additional measures" scenario)

P&M No	Name of mitigation action	Brief description
18	Further promotion of RES for electricity generation	This mitigation action reflects the effect of the delignitification of the Greek power sector by 2028 and the deployment of RES technologies for electricity production to exceed 60% of gross final consumption, as specified in NECP. This mitigation action refers to planned measures in order to increase the share of RES in electricity generation in 2030 from 54.8% (WEM scenario) to 61% (WAM Scenario). Apart from the strengthening of existing policies, the following measures are planned: -support of innovative and pilot projects with high domestic added value; -use of guarantee of origin of electricity from renewable energy sources; -development of a licensing and planning framework for offshore wind farms; -development of a legislative and regulatory framework for power storage stations; -support for the development of RES energy projects by energy communities through the use of specialized financial tools; -reform of the electricity market regulatory framework to promote the participation of decentralized energy schemes; -development of Demand-side management programs of electricity; -development and optimization of licensing framework as well as technical specifications for district heating from RES, biogas injection into the natural gas network, exploitation of geothermal fields.
19	Further biofuel use in transportation	It refers to planned measures, additional to those included under WEM scenario. Apart from the strengthening of existing policies and measures, the following measures are planned: -continue and reinforce the existing regulatory framework for the obligation of both blending or use pure biofuels. The obligation to blend biodiesel with diesel and gasoline with bioethanol will continue, while new enhanced blending obligations will be considered, as well as the possible extension of the measure to other transport sectors. -development of support schemes for biofuels and special financing tools for the production of advanced biofuels. -pilot actions for the use of gaseous fuels in the transport sector -θse of tax incentives to promote alternative fuels in transport (including biofuels)
20	Further promotion of natural gas and energy efficiency in industry	It refers to planned measures, additional to those included under WEM scenario. Apart from the strengthening of existing policies and measures, the following measures are planned: -financial and tax support for energy saving technological investments; -financial support energy efficiency improvement programs for industries and manufacturing enterprises under the new programming period (after 2020); -promotion of relocation of industrial plants at specialized Industrial Business Zones;

P&M No	Name of mitigation action	Brief description
		-promotion of centralized production and distribution of heat at the specialized Industrial Business Zones.
21	Further promotion of natural gas in residential and tertiary sectors and implementation of additional energy efficiency measures in Residential and Tertiary Sector (National Energy Efficiency Action Plan)	It refers to planned measures, additional to those included under WEM scenario. Apart from the strengthening of existing policies and measures, the following measures are planned: -establishment of the National Energy Efficiency Fund; -use of tax incentives for RES facilities (for heating and cooling) in the residential and tertiary sector; -promoting of Energy Savings Contracting in the public sector through targeted funding programs; -financing programs and tax incentives for the renovation of public and private tertiary sector buildings under the new programming period (after 2020); -financing programs for the renovation of public buildings based on the Sustainable Energy Action Plans and Energy Efficiency Action Plans of Municipalities and Regions; -improve of the regulatory framework and strengthen the role of energy managers in public buildings; -promotion of energy management systems in public buildings; -regulatory measures to promote buildings of nearly zero energy; -promotion of Energy Efficiency Agreements in the private sector through targeted financial programs.
22	Road transport measures (additional measures as included in NECP and NTSP)	It refers to planned measures, mainly targeting to the increase the share of electric passenger vehicles in 2030 to 10%, additional to those included under WEM scenario. Aprart from the strengthening of existing policies and measures, the following measures are planned: NECP (National Energy and Climate Plan) -completing the necessary energy charging infrastructure for electric vehicles; -develop a framework for financial support for the use of electric vehicles; -development of sustainable urban mobility plans; -elaboration of plans and implementation of infrastructure for the relocation of commercial transport operations; -fiscal incentives to promote electric (BEV) and pluf-in hybrid vehicles (PHEV) -further incentives for the replacement of private vehicles and light trucks with energy-efficient vehicles. NTSP (National Transport Plan of Greece) -Limitations to import old used cars. Today practically there is no such age limit. -Promoting through taxation new/clean vehicles. -Incentives for the replacement of professional fleet vehicles as well as private passenger vehicles.

P&M No	Name of mitigation action	Brief description
		-Maximum age allowed for all vehicle types.

4.1.3.2 Sectoral policies and measures: Energy (mitigated GHGs: CO2)

4.1.3.2.1 Promotion of natural gas

The introduction of natural gas in the national energy system is one of the largest investments ever carried out in Greece and it constitutes a major priority of the national energy policy. An important part of the infrastructure, mainly the high pressure transmission system and the medium pressure network, which is necessary for the transport of natural gas to the main regions of consumption, has been completed, while the networks' development in the cities is ongoing. Expansion projects of Greek natural gas system are under way in order to link more cities and industries to the system (Figure 5).

Natural gas is becoming an increasingly important fuel in Greece, rising to a share of 28% in power generation and 15% in the total primary energy supply (TPES) in 2016, and more than doubling its share in total final consumption over the last decade. Consumption began increasing in the late 1990s, mainly for power generation and industrial uses, but also later with small shares in the residential and commercial sectors. However, natural gas consumption has fluctuated in recent years, as gas demand decreased with overall energy and electricity demand in the aftermath of the financial crisis, but it has recovered in the last two years. The Greek government has taken several steps towards liberalising and improving efficiency in the gas markets. Most gas is imported from the Russian Federation, and Greece is planning to improve the security of supply through diversification of its supply sources by enhancing liquefied natural gas (LNG) imports and expanding its role as a gas hub for the South Eastern Europe gas market.

Power generation is the largest gas-consuming sector, accounting for half of the total gas consumption in 2015. This share has fallen from levels of around 70% a decade earlier. The decline in natural gas consumption is mainly due to reduced gas power generation, which fell by over half from a peak at 13.9 terawatt hours (TWh) in 2011 to 6.8 TWh in 2014, but increased to 9.1 TWh in 2015, representing 18% of the total power generation. The fall in total electricity generation (12% from 2011 to 2015) and the growth in renewable energy sources (81% from 2011 to 2015), which have replaced natural gas in the power mix, have resulted in a reduction in gas power generation.

The industry sector is the second-largest consumer of natural gas, accounting for 29% of the total gas demand in 2015. This includes natural gas used as petrochemical feedstock in the chemical and petrochemical industry, which represents almost half of industrial gas

consumption. The non-ferrous metals industry (e.g. aluminium) is the largest consumer of natural gas for energy purposes in the industry sector, accounting for nearly one-third of the total gas consumption in industry.

The residential and commercial sectors account for small but growing shares of total gas consumption. Following a drop between 2011 and 2013, gas consumption increased in these sectors to new record levels in 2015, accounting for one-fifth of the total gas consumption. However, natural gas represents only 8% of the total energy consumption in the residential and commercial sectors.

Natural gas (0.7 PJ in 2015) is also consumed in the transport sector, where natural gas moving buses have already been placed in the public transportation system of Athens.

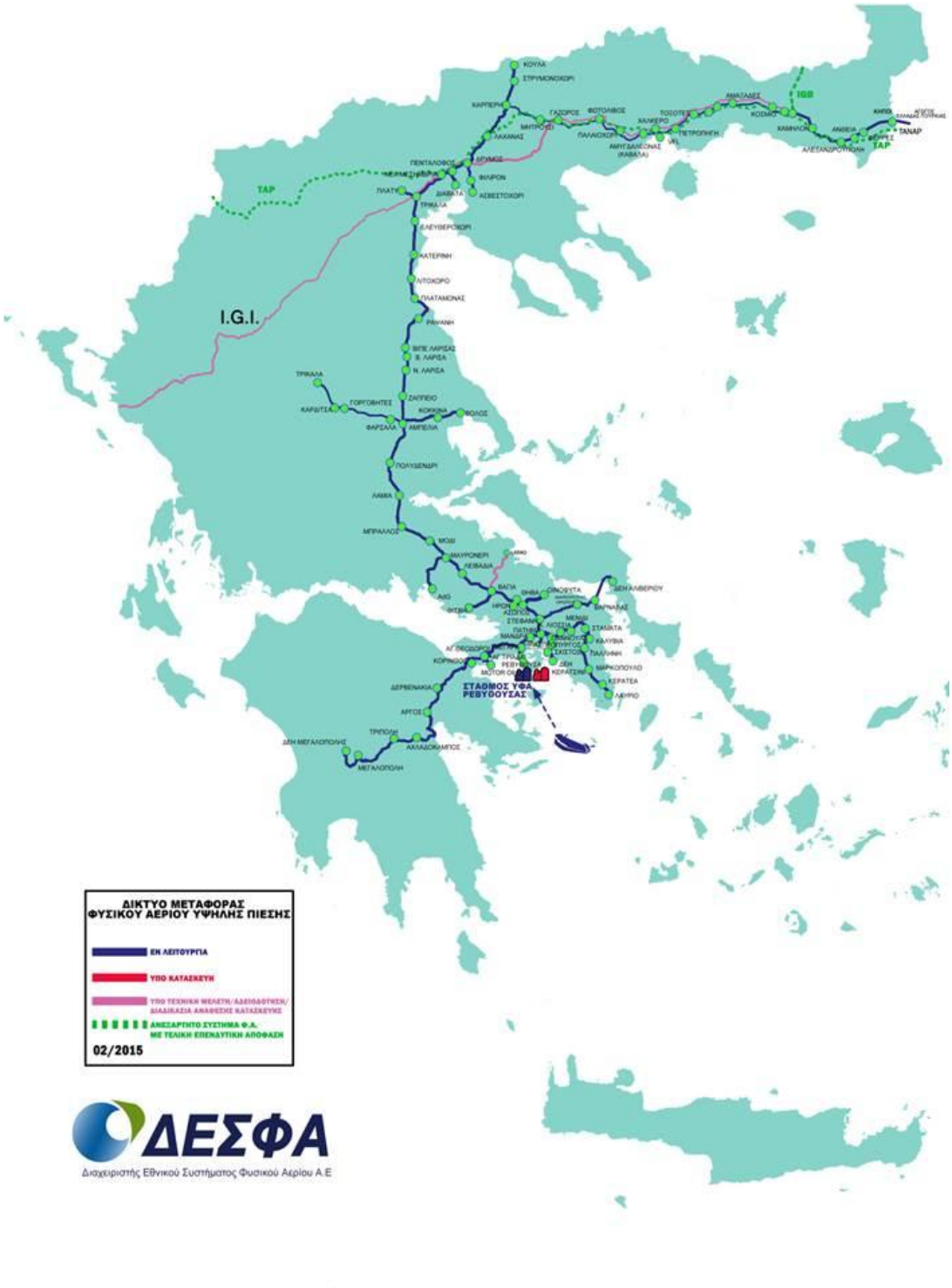


Figure 5 Greek National Natural Gas System

In Table 16, the achieved (2010 and 2015) and the anticipated (2020, 2030 and 2040) penetration of natural gas in the national energy system is presented. The 2010 and 2015 figures are obtained from the national energy balance and the 2020-2040 are according to the

"with measures" projections scenario. In 2015 the installed capacity for electricity production from natural gas was 3,972 MW.

The deregulation of electricity and natural gas markets, as well as the completion of the first private power generation units, are considered as the two main reasons for the increase of the penetration level of natural gas in the power generation sector in the next years.

The period since 2011 has seen developments in the legal and regulatory framework for the Greek national gas market. Law 4001/2011 prepared the basis for the second round of gas market reforms by transposing the third European Union (EU) Energy Package (Directive 2009/73/EC) into national law. The law stipulated unbundling of the operation of the national natural gas transmission system (NNGTS), giving third-party access to the gas infrastructure, and strengthening the role of the regulator. Laws 4336/2015, 4337/2015, and 4414/2016 amended Law 4001/2011 to reform network undertakings and the full unbundling of the natural gas distribution and retail market in Greece in successive steps by 2018. Greece has progressed towards applying the new laws by issuing and implementing secondary legislation and notifying the required regulations.

Finally, important role plays the application of the emission trading system, which, due to the limited emission allowances distributed to the electricity producers and the industrial sector, leads to the further utilization of clean technologies and fuels.

Table 16 ***Penetration of NG in the national energy system and projections according to WM scenario***

Sector	2010	2015	2020	2030	2040
Power sector	86.3	55.1	116.7	80.8	68.8
Road transport	0.6	0.6	1.0	2.5	3.3
Industry	15.6	18.1	29.7	35.4	37.7
Commercial	5.8	6.9	7.8	11.6	16.8
Residential	10.7	14.9	17.8	26.3	42.9

Figures in PJ (NCV)

The actions for the promotion of NG are summarized to the following bullets:

- Fiscal measures (e.g. Reduction of personal income taxation for converting the fuel installation from oil to natural gas, or installing a new natural gas fired one).
- Pricing (always lower price than the competitive liquid fuels, valid for all sectors)
- Discount on connection fees
- Heavy marketing through TV commercial, ads, etc., focusing on the increased efficiency, economy and environmental "friendliness" of natural gas
- Availability of natural gas through continuous development of networks (infrastructure)
- Liberalization of electricity and natural gas markets
- Emission Trading System
- Restriction of environmental permits to industrial installations (e.g. prohibition of petcoke use by the ceramics production units)

The GHG reductions due to use of NG in the power sector are reported in the next section. The estimated reductions of GHG emissions due to implemented / adopted policies in the final demand sectors are presented in Table 17.

Table 17 Estimated GHG emissions reductions from NG use in final demand sectors

Sector	Policy status	2020	2025	2030	2035
Industry	Implemented / adopted	814	832	970	1014
Residential	Implemented / adopted	320	390	475	575
Tertiary	Implemented / adopted	140	170	210	245
Road	Implemented / adopted	18	22	44	50

Figures in kt CO2eq

It should be mentioned that the PaM "Promotion of natural gas" is related to Energy and at a small extent to Transport sector. The affected GHG from this policy is mainly CO2 (more than 99%).

4.1.3.2.2 Improvements in the conventional power generation system – interconnection of islands with the mainland electricity grid – delignification of electricity production by 2028

Electricity demand (in terms of production plus net imports) decreased by 16% from 2008 to 2016 due to the economic crisis. Lignite is the dominant fuel in the generation mix, followed by natural gas and renewable energy sources (solar and wind). The largest electricity consuming sector is the commercial sector, followed by the residential sector. Greece has taken several steps towards liberalising and deregulating the wholesale and retail power markets to increase competition. Greece will be transitioning to the new European Union (EU) target market, with forward, day-ahead, intraday, and balancing markets. Greece has made substantial progress in diversifying the electricity fuel mix, especially in the deployment of variable renewable energy, which increased to almost 19% of the total generation in 2016.

The main implemented / adopted measures for the improvement of the conventional power generation system are:

- The gradual decommissioning of old inefficient and more pollutant thermal power units.
- The commissioning of new power units that follows BAT and the new IED.
- The increase of NG share in electricity production.
- The interconnection of certain islands with the mainland grid.

913 MW of lignite capacity have been decommissioned during 2010-2016, while according to WM scenario, 2.2 GW is planned to have been decommissioned by 2025. Additionally, liquid fuel-fired power units are expected to be decommissioned, due to the interconnection of Aegean islands. The decommissioned capacity will be substituted by NG-fired plants and RES.

The flagship goal under the new revised Government Strategy for the NECP is the highly ambitious but also realistic program for drastically reducing and definitively **ceasing lignite's share in power generation until 2028**, i.e. de-lignification, **with a front-loaded timing** (reflected under WAM scenario). This objective also incorporates the government's vision to address environmental issues in the long run, and to streamline the cost of electricity production in our country immediately. The share of lignite will be replaced mainly by RES and natural gas, while the share of RES will have an increasing trend.

The internal interconnection of some of the northern Cycladic islands is under construction, and is scheduled to come into operation in three steps within 2018-2020 (included under WM scenario). The first phase will connect Syros to the mainland and establish radial interconnections of Paros and Mykonos with Syros; the second phase will link Naxos to Paros and Syros; and the third phase will establish a second link between Syros and the mainland system. This project is considered critical for the following two pillars of the government's energy policy: enhance security of electricity supply and support the development of renewable energy sources so that Greece can meet its renewable energy and greenhouse gas reduction targets. The Cycladic islands have great wind potential, a large part of which has not yet been exploited. It is also planned (and reflected under WAM scenario) to interconnect south and west Cyclades by 2025.

The interconnection with Crete is still at the planning stage, and is expected to be implemented in two phases (2021 and 2023), with two separate links being constructed (reflected under WM scenario). It is also planned to interconnect Dodecanese and North Aegean islands by 2029 and 2031, respectively (reflected under WAM scenario). According to NECP, almost all of the Aegean islands will have been interconnected, within the period 2020-2030. For the islands that will remain non-interconnected, at least for some time, it is foreseen a major reduction in the use of oil for power generation with the installation of modern RES units in combination with storage technologies.

The above-mentioned implemented / adopted measures are estimated to decrease GHG emissions by 15.0 Mt CO2eq in 2020 and 10.4 Mt CO2eq in 2030. The increased share of electricity from RES technologies will cause a reduced use of NG for electricity generation in 2030 compared to 2020.

It should be mentioned that the PaM "Improvements in the conventional power generation system interconnection of islands with the mainland electricity grid – delignification of electricity production by 2028" is related to Energy (Power sector). The affected GHG from this policy is mainly CO2 (more than 99%).

4.1.3.2.3 Promotion of renewable energy sources

Overview

Greece developed its policy framework under the European Union (EU) Renewable Energy Directive (Directive 2009/28/EC), which set out an overall binding national target for Greece

of 18% of renewable energy sources in gross final energy consumption for 2020. The target of RES for 2030 was defined by Greece in the draft integrated national energy and climate plan pursuant to Regulation (EU) 2018/1999. The target of Greece of renewable energy sources in gross final energy consumption for 2030 was set to 31%. However, according to the NECP adopted in December 2019, a significantly higher target in reference to the share of gross final energy consumption of at least 35% is set. This target is reflected to be achieved by WAM scenario. The RES share in 2030 under WM scenario is 25%.

The progress that Greece has made per sector target is presented in *Table 18* and Figure 6. Greece is on track to achieve its target for gross final energy consumption for 2020. As concerns the indicative sector targets, the targets for renewable heating and cooling with shares of around 24% are above 2020 expected shares, while renewable transport is lagging with 1.7% against the 10% target.

Table 18 Progress made towards 2020 RES targets (%)

Sector	2011	2012	2013	2014	2015	2016
RES – heating and cooling	20.23	24.43	24.43	26.85	25.61	24.24
RES – electricity	13.82	16.48	16.48	21.92	22.09	23.80
RES - transport	0.74	1.06	1.04	1.37	1.08	1.68
RES - total	11.03	13.83	14.99	15.32	15.33	15.23

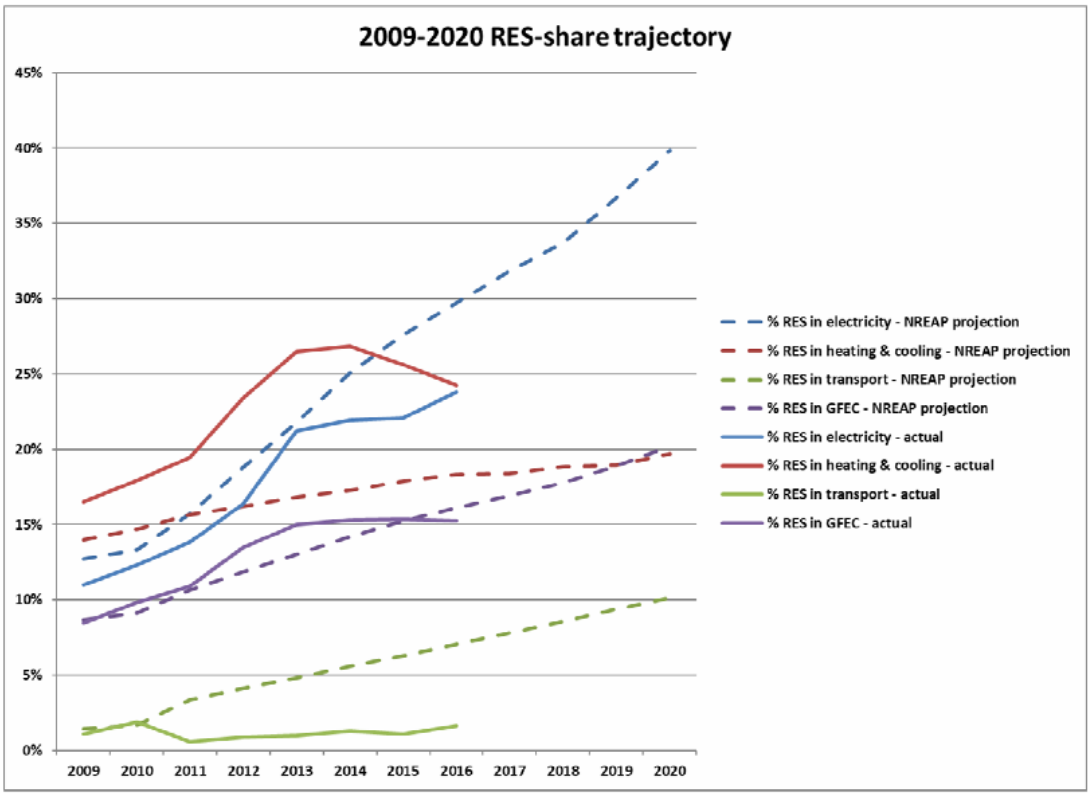


Figure 6 RES share trajectory from 2009 to 2020

In the following table, the evolution of RES share per sector according to the NECP is presented.

Table 19 Evolution of RES share per sector

Evolution of RES share	2020	2022	2025	2027	2030
RES - total	19.7%	23.4%	27.1%	29.6%	35.0%
RES – heating and cooling	30.6%	33.8%	36.8%	38.3%	42.5%
RES – electricity	29.2%	38.6%	46.8%	52.9%	61.0%
RES - transport	6.6%	7.3%	10.1%	11.7%	19.0%

Electricity

Renewable energy sources reached a share of around 24% of electricity generation in 2016. This is the result of a rapid growth in wind and solar installed capacity and the decrease in total electricity supply during the past decade. Total power generation peaked at 62.9 terawatt hours (TWh) in 2008 and has fallen by 22% since then.

Wind power generation increased from negligible levels in the late 1990s to 5.1 TWh in 2016, equal to 10.5% of the total electricity generation. Solar power has had an even more impressive growth, experiencing a nearly twenty-five-fold increase from 0.16 TWh in 2010 to 3.9 TWh in 2016. Hydro power has consistently accounted for the largest share of renewable electricity, but with substantial annual fluctuations. Hydro power production was 5.5 TWh in 2016, equal to 11.4% of the total generation. Greece also has a small share of electricity from biofuels, accounting for less than 1% of the total electricity generation.

During 2006-2015, Greece promoted electricity generation from renewable energy sources through a FiT programme (Feed-in-Tariff), which boosted solar PV deployment in Greece. Law 3468/2006, amended by Law 3851/2010 and significantly revised by Law 4254/2014 to introduce technology and project specific criteria, initialised the program in 2006. The 2014 law retroactively recalculated downward the FiT compensation prices for existing PVs, wind, small hydro, and co-generation installations contained in the signed power purchase agreements. The review aimed to discuss the increasing deficit that appeared in the RES special account, reflecting the high compensation paid to a significant share of existing plants. During 2012-2014, Greece suspended the licensing of new PV installations because the target of 2.200 MW of installed PVs by 2020 had been achieved. Few PV systems have been installed since 2014 in a reflection of the revised lower compensation prices. Greece closed the FiT program on 31 December 2015.

Law 4414/2016 introduced a new renewable energy source support program in August 2016. The key objective of the law was to gradually integrate renewable energy sources and co-generation into the electricity market, with a view to the successive introduction of an electricity target model beginning in 2018. The new renewable energy source support program has been applicable as of January 2016.

Two support forms are available:

- an FiP (Feed-in-Premium) above the electricity market price
- a fixed price support.

The principal instrument of Law 4414/2016 is the FiP. Recognising that the electricity market is in transition, the law included several exemptions and temporary arrangements, including a fixed price support. Essentially, the law states that operating aid is paid to renewable energy source installations that enter commercial or pilot operations in the interconnected electricity transmission system and distribution network of Greece, including high-efficiency co-generation generators, as of 1 January 2016.

The exemptions from the FiP and the requirement to participate in the electricity market are applicable for: small-scale renewable energy source power plants (below 3 MW for wind, and below 500 kW for other renewable energy sources); demonstration projects; and renewable energy source power plants in the non-interconnected islanlds (NIIs). For those projects, a fixed price operating aid contract is concluded between the project operator and LAGIE, the electricity market operator.

A special case is small wind plants (below 50 kW), for which a dedicated FiT programme has already been foreseen under Law 4203/2013 and which is expected to become effective in 2017.

According to Law 4414/2016 and as amended by Law 4467/2017, a special arrangement is foreseen for renewable energy sources and co-generation projects with a power purchase agreement signed before 31 December 2015. Those projects will receive operating aid under the FiT of the previous support program (Law 4254/2014), provided that any such new-build projects enter into commercial or trial operation by 31 March 2019 (in the case of wind, small hydro, biomass, or biogas projects) or by 31 December 2017 for all other renewable technologies and highly efficient co-generation projects.

All other new renewable energy source power plants have to directly participate in the electricity market and have balancing responsibilities. They will receive operating aid in the form of FiPs above the electricity market price. FiPs are calculated as the difference between the revenues obtained by generators from the wholesale market price for each renewable energy source or co-generation technology and the reference value per technology used or per category of power plant.

Law 4414/2016 regulates the reference value. Contracts guarantee the operating aid for 20 years (25 years for solar thermal projects). Ministerial decisions adopted by the Minister of Environment and Energy, following a proposal from LAGIE and an opinion from RAE, have determined the form, content, and details of such new standard contracts.

In addition, from January 1, 2017, a support scheme in the form of Operating Aid for RES and CHP plants entered into force through a competitive process aimed at reducing the cost to consumers, and only those successful in the process will receive operational support. By a Ministerial Decision, the technologies and / or categories of power plants from RES and CHPs that are included in a support scheme.

In 2018, a RES auction scheme for specific categories of PV and wind energy projects was put in place. In this framework, the operating aid of differential premium (sliding feed-in

premium) for specific categories of PV and wind energy projects is granted on the basis of competitive bidding processes. The feed-in premium and in particular the auction scheme is considered the most important policy supporting renewables through 2030. To encourage decentralised renewables-based power generation, Greece is promoting energy communities through which citizens and/or local authorities own or participate in the production and/or use of renewables, as well as net metering, which compensates customers who generate their own power.

The evolution of the share of RES for electricity production, the evolution of the installed capacity and electricity produced by RES till 2030, according to the NECP, are presented in the following tables.

Table 20 Evolution of RES share for electricity production

RES share	2020	2022	2025	2027	2030
Gross electricity consumption (%)	29.2	38.6	46.8	52.9	61.0

Table 21 Evolution of RES installed capacity for electricity production

Installed capacity [GW]	2020	2022	2025	2027	2030
Biomass and Biogas	0.1	0.1	0.1	0.2	0.3
Hydro	3.4	3.7	3.8	3.9	3.9
Wind	3.6	4.2	5.2	6.0	7.0
F/V	3.0	3.9	5.3	6.3	7.7
Solar Thermal Energy	0.0	0.0	0.1	0.1	0.1
Geothermal	0.0	0.0	0.0	0.0	0.1
Total	**10.1**	**11.9**	**14.6**	**16.6**	**19.0**

Table 22 Evolution of electricity produced from RES

Electricity production [TWh]	2020	2022	2025	2027	2030
Biomass and Biogas	0.4	0.5	0.8	1.0	1.6

Hydro	5.5	6.4	6.5	6.6	6.6
Wind	7.2	10.1	12.6	14.4	17.2
F/V	4.5	6.0	8.2	9.7	11.8
Solar Thermal Energy	0.0	0.0	0.3	0.3	0.3
Geothermal	0.0	0.0	0.0	0.3	0.6
Total	**17.7**	**23.0**	**28.4**	**32.2**	**38.1**

Heating and cooling

Greece has around 3 gigawatts (GW) thermal capacity of solar thermal collectors installed on residential houses and some commercial solar heating and cooling installations. Greece is also a leading manufacturer of solar thermal installations, with more than 50% of the production of solar thermal installations being exported.

The condition that FiTs for rooftop PV applications are only applicable to residences that cover a part of their water heating needs by some other renewable energy source (e.g. solar thermal) has encouraged renewable energy use for heat production. This has stimulated fast and early deployment of both solar PV and solar thermal power in Greece. The new Development Law 4399/2016 provides an income tax relief for co-generation plants and renewable energy source heating and cooling plants and also a stabilisation of the income tax coefficient.

Solid biofuels are used for heating in residential boilers, as a means to combat energy poverty. Residential consumption accounts for the largest share of biofuel demand in Greece. Biomass from straw, olive pruning and olive kernels, cotton stalks, and wood residues is used in the food and wood industries for space and process heating (equivalent to 1.6 TWh). Greece has installed 2 MW electrical from biomass, with seven plants.

According to the NECP and regarding the contribution of RES to meet the thermal needs of final consumption, the role of heat pumps is expected to be significantly enhanced, especially in the tertiary sector. In addition to biomass, an increased participation of solar thermal systems and geothermal energy is planned.

Transport

Only a small share of biofuels is used for transport (11%), while the largest share (58%) is used by the residential sector. Biofuels accounted for 2.5% of the final energy consumption in the transport sector in 2015.

Total consumption of biofuels in the transportation sector amounted to 161 thousand tonnes in 2015. Biofuels are mainly first-generation biodiesels produced from raw materials such as oil seeds, mainly sunflower, used cooking oils, and cottonseed. Six thousand tonnes were produced from waste and residues. There are 16 biodiesel producers (125 600 kilolitres (kL)) and six importers (6 400 kL).

Law 3851/2010 set a binding target for renewable energy sources to provide 10% of the final energy in transport by 2020. Greece issued legislation in 2016 to align the Greek biofuels sustainability certification with other EU member states. The share of certified biofuels is expected to rise significantly when all biodiesel quantities distributed in the Greek market will be verified as sustainable as of 1 October 2016 when the new system became effective.

According to the provisions of Law 3054/2002, a specific quantity of pure biodiesel is allocated to beneficiaries to achieve the 7% mandatory percentage of biodiesel blended in diesel (per volume). The allocated quantity corresponds to 85% of the biodiesel that is anticipated to be consumed throughout the year. The remaining 15% is freely marketed among refineries, wholesalers, and biodiesel producers or importers. The biodiesel quantities are allocated every year, after a relevant call for tenders and an evaluation and allocation procedure to stakeholders.

The transformation of Directive 2015/1513/EU in national legislation by Law 4546/2018, complements and forms a comprehensive regulatory framework for the use of biofuels in Greece. In the reformed framework, provision is made for the contribution of both 'first generation' biofuels and advanced biofuels.

In the case of '1st generation' biofuels, a 7% limit on the energy content of biofuels and bioliquids derived from starchy, sugar-bearing, oilseeds (feedstock or feed) is foreseen for national RES targets. In addition, the energy content of biofuels from specific raw materials (such as wastes, residues, non-food cellulosic / lignocellulosic materials, waste cooking oils, animal fats) as well as specific fuels (such as renewable non-biofuel fuels) counts twice as concerns the RES objective in transport.

The new investment law (4399/2016) provides investment support for the production of sustainable biofuels other than food-based biofuels and for the conversion of existing food-based biofuel plants into advanced biofuel plants in accordance with European Commission guidelines. However, biofuels that are subject to supply or blending obligations are excluded from receiving investment support.

According to the NECP, a significant contribution of biofuels is planned for the next decade, especially of the advanced biofuels for the latest years of the period 2020-2030 (*Table 23*).

Table 23 Contribution of biofuels in transport sector

Year	Biofuel (ktoe)
2020	228
2022	238
2025	283
2027	287
2030	371

Mitigation effect

Based on the results of the quantitative analysis that was carried out, GHG emissions reduction potential from implemented and adopted policies on RES exploitation in electricity generation is expected to be 11.0 Mt CO2eq in 2020 and 19.0 Mt CO2eq in 2030. The mitigation effect of planned policies and measures (additional measures to reach NECP targets) is 8.3 Mt CO2eq in 2025 and 11.8 Mt CO2eq in 2030 (included under WAM scenario). Concerning biofuels in transport sector, the estimated reduction of GHG emissions according to implemented / adopted policies is expected to be 650 ktCO2eq in 2020 and 700 ktCO2eq in 2030. The mitigation effect of planned policies and measures is 429 kt CO2eq in 2030 (included under WAM scenario).

It should be mentioned that the PaM “Promotion of RES” is related to Energy and Transport sectors. The affected GHG from this policy is mainly to CO2 (more than 99%).

4.1.3.2.4 Measures in the industrial sector

The main policy instrument for the reduction of GHG emissions in industry is the EU-ETS. By putting a price on carbon and thereby giving a financial value to each tonne of emissions saved, the industrial plants, which are subjected to EU ETS, need to reduce GHG emissions by taking energy-efficient measures, investing in CHP, switching to fuels and / or other feedstock that emit less CO2 (e.g. NG, biomass), etc. The cap and trade principle of EU ETS is described in section 4.1.2.3.

Energy-efficiency improvements and CHP units in various areas of the industry sector have been promoted since the 1st National Climate Change Program through the provisions of the Development Assistance Acts, Law 2244/93 (for CHP plants), the OPE (Measures 2.2 and 2.3) and OPC:

- energy saving interventions (installing building envelope insulation, heat insulated window frames, energy class A air-conditioning units, energy saving light bulbs, high-efficiency burners and boilers, exhaust heat recovery, etc.);
- developing and implementing systems for the recovery/saving and/or substitution of conventional energy and water in the production process;
- the procurement costs of equipment for energy self-production from RES and substitution of fuels with natural gas or LPG;
- bioclimatic and small-scale building interventions to save energy/heat/water;
- conducting energy audits and benchmarking;
- streamlining of equipment, upgrade of facilities and installation of new energy efficient technologies;
- education and training of staff.

Moreover, in compliance with Article 8 of the EU Energy Efficiency Directive, Greece implemented in December 2016 a requirement for large industry to either conduct an energy audit every four years, or implement an energy or environmental management system. Small to medium-sized enterprises will also have access to quality energy audits due to these policies.

It is estimated that the emissions reductions which can be achieved from the implementation of adopted measures in industry (CHP and PaMs included in national Energy Efficiency Action Plan) can reach 200 kt CO2 eq in 2020 and 2030. The mitigation effect of planned policies and measures (further promotion of natural gas and energy efficiency in industry) is

about 1.2Mt CO2eq in 2030 (included under WAM scenario). The affected GHG from this policy is mainly CO2 (more than 99%).

4.1.3.2.5 Measures in residential and tertiary sector

Several actions are included in the Energy Efficiency National Action Plans concerning the conservation and rational use of energy in the residential and tertiary sector. Apart from the introduction of natural gas and RES, the measures concern actions for the improvement of the thermal behavior of residential sector buildings and promotion of energy efficiency appliances and heating equipment. These actions are supported significantly by the incorporation in the Greek legislation of the Directive 2002/91/EC by Law 3661/08 (Official Gazette 89/A 3661 – 19/5/2008) and JMD D6/B/14826 (Official Gazette 1122B – 17/6/2008), which lays down requirements as regards:

- the general framework for a methodology of calculation of the integrated energy performance of buildings;
- the application of minimum requirements on the energy performance of new buildings and existing buildings that are subject to major renovation;
- energy certification of buildings;
- regular inspection of boilers, heating installations and air-conditioning systems in buildings;
- mandatory replacement of all low energy efficiency lights in the public and wider public sector;
- financial incentives and subsidies for the replacement of low energy class household devices with new energy efficient ones.

The adoption and application of the "Energy Performance of Buildings Regulation" (KENAK):

- establishes a methodology for the calculation of the energy efficiency of buildings for the estimation of the energy consumption for heating, cooling, air conditioning, lighting and hot water;
- sets the minimum standards for the architectural design of the buildings, the thermal characteristics of the building materials of the building shell and the standards of the electromechanical installations both for the new and the fully renovated buildings;
- determines categories for the energy ranking of buildings;

- stresses the obligation for new or refurbished buildings to meet 60% of their needs for hot water through solar thermal systems.

Furthermore, L3855/2010 on "Measures to improve energy efficiency in end-use, energy services and other provisions", which transposes Directive 2006/32EC, foresees specific measures for the buildings of the public sector in order to improve their energy performance and achieve energy savings. Additionally, it sets the framework for the establishment of the ESCO market in Greece through Energy Performance Contracts and coordinates the promotion of Green Public Procurement. Other supporting legislation is the Joint Ministerial Decree "Measures to improve energy efficiency and energy saving in the public and broader public sector" where a connection with the natural gas network is made mandatory. It, also, defines, streamlines and facilitates the licensing procedure and framework for the exploitation of geothermal resources for own use through energy systems (ground source heat pumps) for space heating and cooling of a building.

The European Directive 27/2012/EU has been transposed to the national legislation by Law 4342/2015. Pursuant to Article 5 of this Directive, which is entitled "Exemplary role of public bodies' buildings", it has to be ensured that each year 3% of the total floor area of heated and/or cooled buildings with a total useful floor area over 500 m2 owned and occupied by its central government is renovated to meet at least the minimum energy performance requirements that were set in application of Article 4 of Directive 2010/31/EU. In Greece, under this provision there are 82 buildings with total floor area 309712 m2.

In the next tables, the energy efficiency measures related to residential and tertiary sector are presented according to the 4th National Energy and Efficiency Plan. It is estimated that the mitigated GHG emissions from the implemented and adopted policies and measures of the Energy Efficiency National Action Plan that are related to the residential and tertiary sector are estimated at 2.2 Mt CO2eq for 2020 and 2.4 Mt CO2eq for 2030.

The recently adopted NECP sets the objective to improve energy efficiency in the final energy consumption by at least 38% compared to the forecast of the final energy consumption by 2030, so that the final energy consumption does not exceed 16,5 Mtoe in the year 2030. An additional objective is set for the cumulative amount of energy savings to be achieved in the period 2021-2030 in accordance with Article 7 of Directive 2012/27 /EU on energy savings obligations: at least 7.3 Mtoe of cumulative energy savings should be achieved in the period 2021-2030.

Further, an addition objective of annual energy renovation of 3% of the total area of the thermal zone of central public administration buildings is set (around 5,400 m^2 annually). Regarding the residential sector, there is potential for Greece to improve efficiency in its building stock. The renovation rate for the coming period is anticipated to reach 12-15% of the residential building stock. The updated draft NECP estimates a total 600.000 building/building unit energy renovations until 2030.

The mitigation effect of planned policies and measures is about 3.0 Mt CO2eq in 2030 (included under WAM scenario). Planned policies and measures refer to additional policies to those included under WEM scenario, in order to meet the NECP targets. Apart from the strengthening of existing policies and measures, the following measures are planned:

- use of tax incentives for RES facilities (for heating and cooling) in the residential and tertiary sector;
- financing programs for the renovation of public and private tertiary sector buildings under the new programming period (after 2020);
- regulatory measures to promote buildings of nearly zero energy;
- promotion of Energy Efficiency Agreements in the private sector through targeted financial programs.

The affected GHG from the measures described in this section is mainly CO2 (more than 99%).

Table 24 Energy efficiency measures in the residential and tertiary sector buildings (source: 4th National Energy Efficiency Action Plan of Greece)

Title of measure	End-use targeted	Duration	Brief description
Regulation on the Energy Performance of Buildings	Specifications on the design, envelope and electromechanical installations of buildings	Start: 2010 (in progress)	The regulation on the energy performance of buildings (KENAK) introduced an integrated energy design in the sector of buildings to improve the energy efficiency of buildings, energy savings and environmental protection through specific actions: 1. Preparation of a study on the Energy Performance of Buildings 2. Establishing of minimum requirements for energy efficiency in buildings 3. Energy Rating of Buildings (Energy Performance Certificate) 4. Energy inspections to buildings, boilers and heating and air conditioning systems The Study on the Energy Performance of Buildings replaces the study on heat insulation and is be prepared for every new or existing building (over 50m2), which undergoes a complete renovation and is be based on a specific methodology covering: (a) the requirement to meet minimum standards on the design, envelope and electromechanical installations of buildings and (b) its comparison with the reference building. Reference building means a building with the same geometry, position, orientation, use and operating characteristics as the building concerned, which also meets minimum standards and has specific technical characteristics. The Energy Performance Certificate is valid for ten years and applies to all buildings with a surface area of more than 50m2, either new or existing, which undergo complete renovation, existing buildings with a surface area of more than 50m2 or parts thereof, when they are sold or leased, and all public sector buildings. The requirement for an Energy Performance

Title of measure	End-use targeted	Duration	Brief description
			Certificate in case of purchase, sale and lease of buildings, applies as of 9 January 2011. The Energy Performance Certificate includes, among other things, the results of the evaluation by the energy inspector and recommendations for improving the energy efficiency of the building, so that consumers are able to compare and evaluate their actual consumption and any opportunities for improving energy performance. The issue of certificate is mandatory. Energy inspection is an important tool for identifying the energy condition of existing buildings and its potential for improvement, as well as for verifying the implementation of legislation on energy efficiency of new buildings. A private energy inspector, who is in the MEEN Energy Inspectors Register, must inspect the building and place it in an energy category based on the ratio of the building's consumption to the reference building's consumption.
'Saving Energy at Home'	Energy consumption for domestic hot water, heating-cooling	Start: 2011 (completed)	The 'Saving Energy at Home' programme aims at providing financial incentives for energy-saving interventions in the residential building sector with a view to reducing energy needs. The types of housing that can be subsidised by the programme are: • Single-family houses • Apartment blocks - for the part of the block which relates to all the apartments in the building • Individual apartments The types of apartments must meet the following criteria:

Title of measure	End-use targeted	Duration	Brief description
			• must be located in areas with a price band lower or equal to EUR 2 100/m2, as this has been designated until 31 December 2009; • must have a building permit; • must be included under the Energy Performance Certificate (EPC) in class D or lower; • must not have been scheduled to be demolished. The proposal (combination of interventions) for energy upgrade which is submitted with the application should cover the following requirement which is the minimum energy objective of the Programme: it must upgrade by at least one energy class or, alternatively, provide an annual primary energy savings greater than 30% of the reference building consumption (kWh/m2). The eligible categories of interventions for improving energy efficiency are: 1. Replacing window frames / glass panes and installing shading systems 2. Installing thermal insulation in the building envelope, including the roof and pilotis (open parking space in place of the ground floor) 3. Upgrading the heating and domestic hot water system The applications completed by June 2016 as part of the 'Saving at home' programme amounted to 51 659 of a total budget of € 529 million. 83 % of the completed applications involved the replacement of window frames, 53.9 % thermal insulation and 71.6 % upgrade

Title of measure	End-use targeted	Duration	Brief description
			of the heating system and domestic hot water supply. The total area of renovated residences amounts to 5.2 million m2 resulting in total annual primary energy savings of 853.6 GWh.
Mandatory installation of solar thermal systems in new residential buildings.	Energy consumption for domestic hot water	Start: 2011 (in progress)	Solar thermal systems will replace 50-100% of conventional fuels and electricity, depending on the climatic conditions in each area, the load and the position of the building.
Energy upgrading of social housing buildings- 'Green Pilot Urban Neighbourhood' programme	Total energy consumption	Start: 2011 (in progress)	The objective of the programme is to upgrade four industrial buildings to nearly zero energy buildings and optimise the local microclimate. The programme will present the pilot-demonstration and innovative implementation of integrated development and implementation of green and sustainable urban housing units, which are occupied by low-income citizens, and are part of an optimized urban environment. Main criteria for the selection of neighbourhoods was the economic level of residents, the potential energy savings in the buildings and the prospects for significant improvement of the local microclimate.
Compulsory	Energy consumption	Start: 2011	Solar thermal systems will replace 50-100% of conventional fuels and electricity, depending

Title of measure	End-use targeted	Duration	Brief description
installation of solar thermal systems in tertiary sector buildings	for domestic hot water	(in progress)	on the climatic conditions in each area, the load and the position of the building.
Strengthening SMEs active in manufacturing, tourism and trade - services'	Total energy consumption	Start: 2013 (completed)	The programme 'Strengthening SMEs active in manufacturing, tourism and trade - services' aims to provide support to micro-enterprises, small and medium-sized enterprises, whether they are existing, new or in the process of being established, which are making investments which are oriented towards innovations, the environment and information technology.
Energy labelling of appliances and minimum energy efficiency requirements	Energy consumption of electrical and electronics appliances	Start: 2008 (in progress)	Energy labelling of appliances is aimed at informing consumers about the electricity consumption and the energy efficiency rating of these appliances, and the requirement for a minimum energy efficiency of appliances ensures a significant reduction of both energy and environmental costs incurred by consumers.
"Changing my old air-conditioner" action	Energy consumption for cooling	Start: 10/6/2009 End:	The "Changing my old air-conditioner" action involves the provision of subsidies for replacing and recycling of old, energy-intensive household air conditioners. The action is addressed to all citizens/consumers who have old household air conditioners in operation and

Title of measure	End-use targeted	Duration	Brief description
		22/8/2009	wish to replace them. Devices which may be replaced include all types of old air conditioners (regardless of year of construction). Every consumer may replace up to two (2) air-conditioners and buy new ones, of inverter-type and high energy class, from any air conditioner store participating in the action.
Regulation on the Energy Performance of Buildings	Building sector	Start: 2017	Law 4122/2003 (Government Gazette, Series II, No 42, 19.2.2013) approved the Regulation of Energy Performance of Buildings (KENAK), which defines the relevant calculation methodology, the minimum requirements for the energy performance of buildings, the type and content of the necessary Energy Performance Study (EPS) of buildings and building units, the procedure and frequency for the conduction of energy inspections of buildings and heating and cooling systems, the type and content of the Energy Efficiency Certificate (EEC) to be issued, the procedure for issuing this certificate, the monitoring and control of the procedure of the energy inspection, the competent authorities and any other specific issue or necessary detail.
'Saving at home II' programme	Residential sector	Start: 2018	The 'Saving at home II' programme involves the implementation of interventions to improve the energy performance of residences that are proved to have low energy performance and belong to low-income owners who cannot fully fund on their own the energy upgrade of their residence, or in which interventions going beyond the minimum required levels of energy performance will be implemented.

Title of measure	End-use targeted	Duration	Brief description
			The programme is set up to provide incentives for energy saving interventions in the residential building sector aiming at the reduction of energy needs. Aid is to be granted either directly to the beneficiary or in the form of a grant coupled with an interest-free or low-interest loan. The financial instrument to be used for the implementation of the action has been the result of the ex-ante evaluation of a financial instrument for energy-saving actions in the residential sector. The programme concerns buildings that have a building permit or other legalising document, are used as main residence and whose owners meet specific income criteria. Eligible interventions include: 1. Replacement of window frames with new thermal insulated/break frames with double glazing. 2. Installing thermal insulation in the building envelope, including the flat roof/roof and pilotis. 3. Upgrade of the heating system. 4. Upgrade with RES systems for heating/cooling. In this category, it is possible to install a solar system to provide DHW and/or assist the main heating system (collector, water storage tank, support, piping, etc.) as well as a system for accommodating the heating/cooling loads, that operates through the use of renewable energy sources (e.g. biomass burner, heat pumps,

Title of measure	End-use targeted	Duration	Brief description
			solar thermal systems, etc.) or a high-efficiency CHP system (HECHP). The energy upgrade proposal (combination of interventions) submitted with the application should cover the minimum energy objective of the programme which is different in the case of low incomes.
Replacement of oil-fired heating systems with gas-fired ones in residences	Residential sector	Start: 2018	The action 'Replacement of oil-fired heating systems with gas-fired ones in residences' involves the subsidy for the cost of the internal gas installation to replace existing oil-fired heating systems in residences, with a view to reducing emissions of gaseous pollutants by improving the energy efficiency of residential heating systems and increasing gas penetration in urban areas. The action involves supporting low-income owners who cannot fully fund on their own the replacement of the existing oil-fired heating system with a natural gas system. This action will strengthen residences located in low-price zones of Attica where the penetration of natural gas is low.

Table 25 Energy efficiency measures in the public tertiary building sector (source: 4th National Energy Efficiency Action Plan of Greece)

Title of measure	End-use targeted	Duration	Brief description
Integrated energy	Total energy consumption of	Start: 2009	The 'ENERGY EFFICIENCY' programme is made up of the following selected priority axes:

Title of measure	End-use targeted	Duration	Brief description
planning by local authorities	the target group Fuel consumption in transport	(in progress)	Axis 1: Interventions to existing municipal buildings • Energy upgrade of the building envelope (exterior insulation, replacement of glazing and window frames, installing roofing, awnings and special coatings to provide protection from the sun) • Energy upgrade of electro-mechanical heating and cooling installations • Upgrade of the natural/ artificial lighting system • Installing an energy management system Axis 2: Interventions to public areas of the urban environment • Integrated energy saving and management interventions in municipal lighting • Bioclimatic interventions to improve microclimate and energy efficiency in urban areas. Axis 3: Interventions in urban transport • Interventions in municipal fleet vehicles to improve their energy efficiency • Urban mobility studies • Transport studies Axis 4: Interventions in municipal technical infrastructure Axis 5: Dissemination, networking and information actions The following actions are financed by the 'ENERGY EFFICIENCY' programme: (1) Energy upgrade of the building envelope, including all relevant operations • Installing thermal insulation (building envelope, bearing structure, flat roof, roof, floor, walls) • Replacing old windows, doors, window frames and glass panes • Use of special coatings (cool materials) on roofs and facades • Installing external shading • Natural/night ventilation • Installing/integrating passive solar systems

Title of measure	End-use targeted	Duration	Brief description
			(2) Energy upgrade of electro-mechanical installations, including all relevant operations • Upgrade of the central heating system, including compensation systems in the burner-boiler in combination with pipe insulation • Upgrade of the air-conditioning system • Upgrade of pumps-motors • Mechanical ventilation • Hybrid ventilation with ceiling fans • Installation of renewable energy systems to cover heat loads (solar thermal systems, shallow geothermal energy, etc.) (3) Upgrade of the natural/ artificial lighting system (4) Installation of an energy management system, including all relevant operations • Measuring, monitoring, recording, processing, control and viewing systems –on site and online - for the operating data and results of the building energy management systems (BEMS) • Data visualisation systems (5) Interventions in the energy upgrade of technical infrastructure/ other facilities of LAs, including all relevant operations • Energy upgrade of open sports grounds • Energy upgrade of sewage treatment plants, pumping stations, etc.
Energy saving interventions in public buildings	Final energy consumption of the buildings in the target group	Start: 2010 (completed)	Implementation of energy interventions in public buildings to improve energy efficiency. Projects involving heating and/or cooling energy generation from RES and energy saving will be financed under the programme 'Standard demonstration projects on the use of Renewable Energy Sources (RES) and/or Energy Saving (ES) in public buildings' to reduce energy requirements for heating, cooling, lighting

Title of measure	End-use targeted	Duration	Brief description
			and domestic hot water. The programme aims at achieving energy savings in the central and the general government, encouraging and increasing the use of RES through standard demonstration projects, reducing air pollution and reducing emissions of gases that cause climate change. The actions to be funded include: • applying heat insulation • replacing window frames and glass panels • passive solar systems • natural lighting and ventilation systems, external shading systems for the openings of the building • mechanical cooling-ventilation systems • extensive roof planting • replacing burner systems/boilers with a RES, natural gas, LPG system • replacing old air conditioning systems with new central high-efficiency ones • interventions for a compensation system in the burner/boiler and insulation of pipes • installation of measuring, data recording and monitoring systems for the energy installations in buildings.
Interventions for improving energy efficiency in school buildings	Final energy consumption in new or under construction school buildings	Start: 2011 (completed)	Implementation of projects in existing and new or under construction school buildings to improve energy efficiency. The 'Bioclimatic Demonstration Schools' programme promotes bioclimatic design interventions in new or under construction primary and secondary education schools aimed at achieving energy savings. The actions funded include: (a) constructing school buildings having fully integrated the principles of bioclimatic design,

Title of measure	End-use targeted	Duration	Brief description
			(b) supplying and installing passive and active solar systems, hybrid systems and renewable energy systems, including natural lighting and ventilation systems, solar chimneys, solar protection and shading systems and green roofs, (c) various support systems and network connections, including data metering, recording and monitoring systems for the energy systems of buildings, as well as control and operational management systems for electromechanical installations, (d) studies and other actions. The programme 'Standard demonstration projects on the use of RES and/or ES measures in existing public primary and secondary education school buildings' includes projects to be implemented in existing primary and secondary education school buildings to increase heating and/or cooling energy generated from RES and energy saving by reducing energy by reducing energy requirements for heating, cooling, lighting and hot water. Actions to improve energy efficiency and rational energy management funded include: (a) installing heat insulation to building envelopes, shading, sun protection systems and other elements to improve the energy efficiency of the building envelope, (b) using special coatings, cool materials, on roofs (c) replacing window frames and glass panes with new certified, energy-efficient ones (d) passive solar heating systems (e) natural and artificial lighting systems (f) natural and/or hybrid ventilation and cooling systems and techniques (g) roof planting (h) bioclimatic interventions in the surrounding area (i) upgrading and modifying existing central heating and/or conditioning installations, premises and installations of Domestic Hot Water (DHW), (j) connections to the natural gas distribution network

Title of measure	End-use targeted	Duration	Brief description
			An essential condition of the programme is that the building will be upgraded by at least one energy class.
Compulsory installation of central solar thermal systems to meet hot water requirements	Energy consumption for domestic hot water, heating-cooling	Start: 2011 (in progress)	Solar thermal systems will replace 50-100% of conventional fuels and electricity, depending on the climatic conditions in each area, the load and the position of the building.
Compulsory replacement of all low energy efficiency light fittings in the public sector and the wider public sector	Energy consumption for lighting	Start: 2006 (in progress)	The replacement of filament lamps by compact fluorescent lamps or by other low-consumption lamps which use 80% less energy and have a lifespan which is almost ten times longer will produce immediate substantial results. For this purpose, the following are mandatory: • replacing all low energy efficiency lighting units with high efficiency units (lamps, ballasts, reflectors, etc.). • annual recording / reporting of energy interventions and redetermination of the target for further improvement.
Energy managers in public sector and general government buildings	Total energy consumption	Start: 2014 (in progress)	Designation of an energy manager in central and general government buildings to improve energy efficiency. The institution of energy manager in central and general government was introduced by JMD Δ6/B/14826 (Government Gazette, Series II, No 1122, 17-06-2008) 'Measures to improve energy efficiency and energy savings in the central and general government' which described the competences of energy managers and allocated responsibility for implementing the measure to specific competent public bodies. The energy manager may be responsible for one or several buildings of each body, in accordance with operational needs and the total staff capacity, usable area and volume of the body's buildings. The energy

Title of measure	End-use targeted	Duration	Brief description
			manager may be an engineer with a university degree in a subject related to their specialty, or with a technical education if there is no comparable university education, and is designated by the Secretary General of the competent Ministry or the Region or the management board of said body. The responsibilities of the energy manager include: (1) collecting data on the energy consumption of buildings, (2) keeping a mandatory file or database on the energy consumption of the building, (3)preparing an annual summary report on energy-saving tracking and monitoring in accordance with the procedures, requirements and guidelines for conducting energy inspections required by Joint Ministerial Decision Δ6/B/oik. 11038/1999 (Government Gazette, Series II, No 1526, 08-07-1999), (4) verifying the proper operation of central heating and cooling installations and conducting periodic maintenance of boilers-burners and air conditioning units, (5) monitoring maintenance or repair works to improve energy efficiency.
Energy upgrading of public buildings	Public sector	Start: 2018	The programme ‘Energy upgrading of public buildings’ aims at energy upgrading of energy-intensive public buildings, exploiting the potential for energy savings and improving energy efficiency in the building sector, with public sector buildings being an example to mobilise the entire economy. The first call for this programme is titled ‘Energy Upgrading and Energy Savings Actions and Utilisation of Renewable Energy Sources (RES) in Sports Facilities’.
Holding Fund under	Public sector	Start: 2018	The Holding Fund under the name ‘Infrastructure Fund’ - which was set up with Ministerial Decision No

Title of measure	End-use targeted	Duration	Brief description
the name 'Infrastructure Fund – Projects for the energy upgrade of public buildings			6269/29.11.2017 (Government Gazette, Series II, No 4159), aims at maximising the use of the Financial Instruments to cover the financial gap, inter alia in the fields of Energy Saving and Promotion of Renewable Energy Sources (RES). As part of the Fund, resources from the Operational Programme 'Competitiveness, Entrepreneurship, Innovation' (OP-CEI) relating to these areas will be drawn, in conjunction with national resources from a European Investment Bank (EIB) loan and repayments of the JESSICA financial instrument for the period 2007-2013. The liquidity of public and private entities will be strengthened through the Infrastructure Fund, for the implementation of projects with favourable funding conditions. In the energy sector, the projects that will be financed by the Infrastructure Fund and are related to the resources to be allocated by OP-CEI will concern projects for the energy upgrading of public buildings, as well as projects for the production and distribution of energy from RES.
Improving the energy efficiency of SMEs	Tertiary sector	Start: 2018	The 'Improving the energy efficiency of SMEs' programme aims to support micro, small and medium-sized enterprises in order to improve their energy efficiency. The action involves: • Interventions in the building envelope: Thermal insulation, window frames/glazing, shading systems. • Upgrade of internal electrical installations and power distribution systems. • Upgrade of systems for the production and distribution of thermal energy both for cooling/heating purposes and in production. (e.g. hot water/steam generating equipment and systems, waste heat recovery equipment, etc.). • Upgrade or inclusion of new materials and equipment to reduce energy losses. • Upgrade of lighting equipment. • Installation of energy management systems. • Energy inspections and/or energy audits before and after assessing the energy outcome.

Title of measure	End-use targeted	Duration	Brief description
			• Certification of the energy management system according to ISO 50001. • Project consultant.

4.1.3.3 Sectoral policies and measures: Transport (mitigated GHGs: CO2)

GHG emissions from the transport sector present a declining trend mainly due to economic crisis. Nevertheless they are still considerable both in Greece and in European Union, and, consequently the implementation of suitable policies and restriction measures is required. The main axes of intervention and implemented policies and measures in the sector, beyond the introduction of biofuels for road transport and natural gas in the public system of transport that were already described previously, are shortly presented below:

(A) Interventions in the transport system

Public works to enhance the existing infrastructure described in the previous National Communications (road-grid improvements in the large urban centres, reconstruction of major highways, improvements in the traffic-light system) are in progress.

Programmes for the upgrading of the traffic lights system (road signaling), as well as the overall traffic management and control have been developed since 2002 in Athens. Therefore, half of the traffic lights in the region of Athens (roughly 1500) are in cooperation, while the Centre of Traffic Management, which belongs to the Ministry of Infrastructure, Transport and Networks, collects traffic information from 842 traffic nodes in a daily base. According to collected information, processes for the improvement of the road signaling have been established.

Greek law 4233/2014 sets the possibility to install public charging stations for electric cars in gas stations, in parking places and in car service stations as well as in vehicles control stations. The Law 4439/2016 aims at the development of infrastructures in the transport system for alternative fuels e.g. electricity, hydrogen, biofuels, natural gas, liquefied natural gas, compressed natural gas, liquefied petroleum gas, to substitute conventional fossil fuels, incorporating in Greek legislation the Directive 2014/94/EC. However, the most important policy measure for promoting RES in transport is the obligation of mixing transport diesel with biodiesel and gas with bioethanol.

The decrease of the use of petroleum products is not important as it is expected to be of the order of 7% in 2030 comparatively to 2016. Biofuels use is expected to increase substantially from a percentage of 2% in 2016 to 7% in 2030. Electricity share in 2030 is expected to reach 2%. Nevertheless, if fuel consumption from aviation and domestic navigation is excluded, the decrease of the share of petroleum products is more important as from 96% in 2016 is expected to limit to 86% in 2030 as a result of the penetration of electricity and biofuels in road transport. It is foreseen that electric cars will correspond to the 5% of the passenger cars stock in 2030 under WEM scenario and 10% under WAM scenario.

(B) Interventions in public transport

Important interventions have already been implemented or are under development aiming at the enforcement of public transport. In Athens, the two new metro lines, which were completed and started operation in 2000, are being expanded, while new metro lines are in the implementation phase. In Thessaloniki a new metro line is under construction expected to operate in 2021. The operation of the suburban railway in the wider area of Athens has already started, the connection to Corinthos and Chalkida are completed, while the connection with Livadia is expected to operate in the near future. The extension of the suburban train from Kiato to Patras is under construction. Moreover the connection of Lavrio and Rafina in Attica are also foreseen through the extension of the suburban train. Also in 2004, a new tram started operating in Athens with 2 lines reaching from the centre of the city to the southern waterfront suburbs.

In the course of 2019, the completion of the electrification of the itinerary Athens-Thessaloniki-Eidomeni was accomplished.

The aim of the measure "Development of Infrastructures in Transport Sector" which started in 2006, was the decrease of the trip duration of PCs and of public transportation, quality improvement and safety and fuel saving. The development of sustainable urban mobility plans which started in 2011 and is still in progress, is another measure aiming at emissions and fuel consumption decrease. The measure "Promotion of economical, safe and eco-driving" started in 2008 and is still in progress.

Concerning rail transport, since 2000, more than 250 km of new rail lines have been constructed (including replacement of old single lines), while more than 220 km rail lines have been converted to electrical driven. Besides, more than 300 km of new rail lines are under construction phase.

Extended network of bus lanes of approximately 50 km length has already been created, resulting in the increase of the average speed of buses in Athens from 16 km/h to 23 km/h. The fleet of buses has been renewed to a large extent, while more than 400 buses use natural gas as fuel and 100 buses operate with engines of Euro V technology. Moreover the renewal of the fleet of electrically driven buses (trolleys) began in 1998 with the supply of 224 vehicles and was extended with the supply of additional 142 vehicles by the end of 2004.

Especially in the Metropolitan Athens Area, the public transportation fleet is one of the newest in European level comprising of 360 trolley of antipollution technology and 2153 buses of which:

- ✓ 398 Euro 1
- ✓ 1033 Euro 2 (294 CNG),

- ✓ 402 Euro3 (120 CNG),
- ✓ 220 Euro 4,
- ✓ 100 Euro 5

It is expected that in 2021, at least 800 new buses will be bought for use in the metropolitan areas of Athens and Thessaloniki replacing the older vehicles.

In addition, by Law 2963/2001 (A 268), an age limit of 23 years has been instituted for all urban, semi-urban and long distance buses. Also the limit of 11 years was set as the higher permissible age for buses in public transport. Under the provisions of the same law, economic incentives were given in the owners for the replacement of vehicles with new or used vehicles of small age. Of the 5000 semi-urban and long distance buses licensed in Greece, 1846 buses have been replaced since 2004, of which 1746 with new and 100 with used of age lower than 5 years. Moreover, the replacement of tourist coaches was encouraged by subsidies provided for in Article 31 of Law 3229/2004. By Article 7 of Law 2446/96, an age limit of 23 years has been also instituted for them. The replacement program was supervised by the Ministry of Tourism and the former Ministry of Economy and Finance.

Promotion of the use of natural gas in public transportation and in other public vehicles (garbage trucks etc.) as well as promotion of biofuel vehicles. Furthermore, the National Plan for Energy and Climate (NECP) (see section 4.1.2.1) includes measures for the use of CNG and other alternative fuels.

In most EU countries, the maximum withdrawal age for taxis is 10 years. In Greece the replacement age for taxis is 15-18 years.

Finally, the public transport system in Athens is being reorganized on the basis of the new metro and tram lines, with buses and trolleys also playing a complementary role of connecting the metro and tram stations with other areas of the city.

(C) Interventions in vehicles

The main regulation that aims at the restriction of GHG emissions from vehicles is the one requiring regular technical checks of vehicles, which has been mandatory since 1983 and takes place at the Centres for Technical Control of Vehicles (CTCV). The law provides for the establishment of private Centres for Technical Control, the improvement of public ones and the development of a special organization to supervise the operation of the above-mentioned Centres. Currently, according to data of the Ministry of Infrastructure, Transport and Networks, 56 public and 37 private centers operate and other 40 have been licensed and start or expected to start

operation in the coming period. With the increase of the CTCV number during the next period, the essential conditions and infrastructures for an important increase of the number of checked vehicles per year are created, in accordance with the objectives of the National Program.

An equally important intervention for GHG emissions reduction from vehicles is the exhaust control card, which is required for all vehicles and should be renewed on an annual basis for private passenger cars and trucks up to 3.5 t. Certified auto-repair shops expressly certified to carry out this task and issue the control card.

Moreover, under the framework of the implementation of policies for the replacement of old vehicles, a list of actions has been taken place. The buses fleet is being renewed, aiming to the improvement of energy efficiency of vehicles.

The voluntary agreement between the European Commission and the European, Japanese and Korean car-manufacturers associations to improve the fuel efficiency of new cars is considered as an adopted measure aiming at the reduction of GHG emissions in conjunction with promotion of ecologic labeling – energy labeling of passenger cars. The agreement foresees the improvement of the fuel efficiency of new cars, so as the CO2 emission factor to reach down to 140gr/km in 2008. The measure is expected to have an important long-term output through the penetration of low emissions vehicles in the total fleet. The mandatory quota with energy efficient vehicles in public services or organizations and the linking of vehicle tax with energy efficiency and CO2 emissions were also adopted.

According to the foreseen EU targets, for 2030, a 30% decrease of emissions of PCs and LDVs in comparison to 2021 emissions is expected[26]. The corresponding target for 2025 includes a decrease of 15% of CO2 emissions in comparison to 2021 emissions. The respective standards for HDVs include a decrease of of 30% of CO2 emissions in comparison to 2019 emissions[27].

Finally, the development of urban mobility plans and the promotion of eco-driving, interventions for the safe movement of bicycles in the cities and the construction of new bicycle paths are measures that are expected to contribute to GHG emissions reduction.

(D) Measures for addressing air pollution from road traffic in urban centres

[26] https://ec.europa.eu/clima/sites/clima/files/transport/vehicles/docs/swd_2017_650_p1_en.pdf;https://ec.europa.eu/clima/sites/clima/files/transport/vehicles/docs/ldv_co2_technologies_and_costs_to_2030_en.pdf

[27] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=comnat:SWD_2018_0185_FIN

In July 2009, the former Ministry for the Environment, Physical Planning and Public Works (present Ministry of Environment and Energy) introduced a package of measures for addressing air pollution from road traffic. These measures concerned the calculation of Environmental motor vehicle circulation fee (road tax), incentives for fleet renewal and removal of vehicles as well as a proposal for a "Green" traffic ring. These measures were applied only for a few months in 2009 and they were cancelled by the next Ministry of Environment, Energy and Climate Change. In their place new measures were applied. More specifically, new circulation taxes were decided to be applied from November 2010 for all new vehicles according their CO2 emissions. This measure obviously aims at promoting new technology vehicles of low CO2 emissions. Additionally, a new withdrawal system for old passenger cars with financial incentives was set in early 2011 but with poor results because of the economic crisis. This measure was applicable until the end of 2016. Moreover, the green ring was adopted in 2012 concerning traffic restriction measures for the older technology cars in the centre of Athens. The main regulation that aims at the restriction of both GHG and air pollutant emissions from vehicles is the one requiring regular technical checks of vehicles, which has been mandatory since 1983 and takes place at the Centres for Technical Control of Vehicles (CTCV).

Financial incentives are foreseen to support the penetration of new low or zero emissions vehicles to the market. More specifically, electric cars are not subject to the yearly vehicle circulation tax, registration tax and luxury tax whereas hybrid cars are exempted from the 50% of the registration tax.

The measure "Eco-labelling – Energy label for cars", started in 2002 and is still applied, in compliance with Directive 1999/94/EC. The measure "Compulsory quotas of vehicles with greater energy efficiency in the fleets of the public services and of public bodies" has started in 2012 and aimed to promote energy efficient and low emissions vehicles in the public sector. The linking of vehicle taxation to energy efficiency and CO2 emissions, adopted in 2010, aims to promoting energy efficient, low emissions vehicles.

In NECP, incentives to promote electric (BEV) and plug-in hybrid (PHEV) cars are foreseen. Measures to promote old cars replacement are also foreseen in NECP and in the National Transportation Strategic Plan (NSTP). According to NECP, the share of electric passenger cars will be increased up to 30% of new registrations.

(E) Fiscal measures

Fiscal measures (e.g. car registration and road tax) were presented in section 4.1.2.5.

(F) EU transport sector policies

The mitigation of transport GHG emissions is also supported by EU transport sector policies. More specifically, the **CO2 and Cars Regulation (EC) No 443/2009** limits CO2 emissions from new cars to a fleet average of 130 grams of CO2 per kilometre (g/km) by 2015 and 95 g/km by 2021. The 2015 and 2021 targets represent reductions of 18 % and 40 % respectively, compared with the 2007 fleet average. In 2014, Regulation (EU) No 333/2014 on modalities for reaching the 2021 target for cars was adopted. Implementing the 2021 emission targets for cars is expected to result in annual savings of 24.9 Mt CO2 in 2021, and 43.6 Mt CO2 in 2030 (EU wide mitigation impact).

The CO2 and Vans Regulation (EU) No 510/2011 limits CO2 emissions from new vans to a fleet average of 175 g/km by 2017 and 147 g/km by 2020. These cuts represent reductions of 14 % and 28% respectively, compared with the 2007 average. The annual CO2 equivalent savings are expected to be 1.9 Mt in 2020 and 5.3 Mt in 2030 (EU wide mitigation impact).

The data published by the EEA indicates that the EU car and van fleets will have met their targets well ahead of the deadlines. The average specific emissions of the European fleet in 2014 were 123.4 g/km for new cars (compared to the 130 g/km target for 2015) and 169.2 g/km for new vans (compared to the 175 g/km target for 2017). Provisional data published by the European Environment Agency showed that good progress continues to be made on fuel efficiency of new cars, with the average emissions level of a new car sold in 2016 at 118.1 grams of CO2 per kilometre, significantly below the 2015 target of 130 g .

The Directive 1999/94/EC on Car Labelling is a demand-side policy and an important complementary measure to help car manufacturers to meet their specific CO2 emission targets and to raise consumer awareness on fuel use and CO2 emissions of new passenger cars. It requires that information relating to the fuel economy and CO2 emissions of new passenger cars offered for sale or lease in the Union is consistently made available to consumers in order to enable more informed purchase decisions.

A number of Regulations are in place related to **environmental and safety requirements of tires and gear shift indicators (GSI)**. Regulation (EC) No 661/2009 aims at increasing the fuel efficiency of motor vehicles by introducing tyre pressure monitoring systems and GSI. In addition, Regulation (EC) No 1222/2009 on the labelling of tyres aims at influencing energy demand by promoting the market transformation towards fuel-efficient tyres. The Regulations' total CO2 emission savings from all vehicle types are expected to range from 1.5 to 4 Mt annually by 2020 (EU wide mitigation impact).

Directive 2009/30/EC on Fuel Quality tightens the requirements for a number of fuel parameters. The Directive introduces a binding target for fuel suppliers to reduce lifecycle GHG emissions per unit of energy from fuel and energy supplied by 6 % by 2020 compared to 2010. The reduction is to be obtained through the use of biofuels, alternative fuels, electricity in road transport or reductions in upstream emissions such as from flaring and venting at production sites. The expected savings of 6 % of total well-to-wheel road transport CO2 emissions in 2020 amount to roughly 55 Mt CO2 in 2020 (EU wide mitigation impact)., excluding indirect land use change (ILUC) emissions. Council Directive (EU) 2015/652 specifies calculation methods and reporting requirements under the Fuel Quality Directive.

The **Directive 2014/94/EU on Deployment of Alternative Fuels Infrastructure** requires Member States to adopt national policy frameworks for the market development of alternative fuels and their infrastructure, including targets for the build-up of alternative fuel infrastructure. The Directive also sets common technical specifications for the infrastructure interface and requests development of an alternative fuel labelling system to ensure clarity in the consumer information on vehicle/fuel compatibility, as well as an alternative fuel price comparison methodology. The Directive 2014/94/EU was transposed to Greek legislation by Law 4439/2016.

Policy measures for the promotion of the RES penetration in transport sector through biofuels have been planned in the framework of compliance with **Directive 2009/28/EC**.

The **Directive 2015/1513/EC**, ratified by Greek law 4546/2018 complements and forms a regulatory framework for the use of biofuels in Greece. Greek law 3054/2002 includes various policy measures for the promotion of the use of biofuels.

(G) Mitigation effect

The mitigation effect of implemented / adopted policies and measures in the transport sector is estimated to be 560 kt CO2eq in 2020 and 650 kt CO2eq in 2030. The effect of planned policies and measures (reflected under WAM scenario) is estimated to be 190 kt CO2eq in 2030. The above figures do not include the mitigation effect of the use of biofuels and NG in transport sector, which has been reported in previous chapters 4.1.3.2.1 and 4.1.3.2.3.

4.1.3.4 Sectoral policies and measures: Industrial processes (mitigated GHGs: HFCs, PFCs, SF6)

Most of the industrial processes emissions (with the exception mainly of the emission from the use and consumption of fluorinated gases) are regulated by the EU-ETS market-based mechanism (e.g. CO2 emissions from plants producing cement, lime, ceramics, glass, iron and steel, ferroalloys,

aluminium (PFCs), nitric acid (N2O)). The cap and trade principle of EU ETS is described in section 4.1.2.3.

To control emissions from fluorinated greenhouse gases (F-gases), including hydrofluorocarbons (HFCs), the European Union has adopted two legislative acts: the 'MAC Directive' (2006/40/EC) on air conditioning systems used in small motor vehicles, and the 'F-gas Regulation' (No 517/2014) which covers all other key applications in which F-gases are used. The two strategies described in the abovementioned regulation to reduce emissions is to prevent leakage and emissions {Emission prevention and leak checks, Control of by-production, End of life treatment of products and equipment, Training and qualification, Information for users (labelling, product info)} and control of use of F-gases (ban on new applications, Ban on uses, Phase-down of HFC supply). Several control mechanisms and penalties are implemented in Greece. Checks for compliance with these regulations of the European Union are carried out by the relevant bodies and agencies of the competent authorities, as appropriate, in the context of their remit. In cases of infringement of the provisions of the relevant EU Regulations by legal or natural entities of the public and private sector, sanctions are imposed by the relevant bodies and agencies of competent authorities.

It is considered that the action taken by the EU and its Member States under the F-gas Regulation will enable the EU to comply with the Kigali amendment to the Montreal Protocol on a global phase-down of hydrofluorocarbons (HFCs).

It is estimated that the mitigated GHG emissions from the implemented and adopted policies and measures that are related to the reduction of emissions of fluorinated gases are estimated at 460 kt CO2eq for 2020 and 2.3 Mt CO2eq for 2030.

4.1.3.5 Sectoral policies and measures: Agriculture (mitigated GHGs CH4 and N2O)

Agricultural activities can result in methane emissions from livestock digestion processes and storage of animal manure and the use of organic and mineral nitrogen fertilizers can lead to nitrous oxide emissions.

The agriculture sector has the specialty that it is mainly driven by one policy, the Common Agricultural Policy (CAP), which determines a common way for all Member States of the European Union.. The present day CAP contains both a climate action objective, a number of measures (both compulsory and voluntary for farmers and Member States) which are intended to secure climate benefits (Pillar I – direct payments to farmers), and a requirement for a minimum proportion of funding to be spent on environment and climate measures (Pillar II – rural

development policy). These arrangements have developed over time. In Greece, the Implementation of the current Common Agricultural Policy (CAP) regulations started in 2015 (with 2014 being a transitional year).

Pillar I – direct payments to farmers

The direct support arrangements mark a shift from 'decoupling' to 'targeting'. The system, based on decoupling agricultural aid from production and providing generic income support that was introduced in 2003, has been replaced by one in which each component is linked to specific objectives. Single farm payments have been replaced by a system of multi-purpose payments, with seven components:

1. a 'basic payment' per hectare, the level of which is to be harmonised according to national or regional economic or administrative criteria and subject to an 'internal' convergence process;
2. a 'greening' component, as additional support to offset the cost of providing environmental public goods that are not remunerated by the market;
3. an additional payment for young farmers;
4. a 'redistributive payment' whereby farmers may be granted additional support for the first hectares of farmland;
5. additional income support in areas with natural constraints;
6. coupled support for production, granted in respect of certain areas or types of farming for economic and/or social reasons;
7. a voluntary simplified system for 'small farmers'.

Member States must use 30% of their national direct-payment allocations to fund the greening component. The rationale for greening of CAP direct payments was to further encourage environmentally sustainable and climate beneficial agricultural practices over the majority of the farmed countryside, where direct payments are applied. The greening component in Greece is regulated by MD 104/7056 GG 147 / 22-1-2015. In order to receive the greening part of the direct payments, the following agricultural practices with direct climate impact should be followed:

Table 26 Agricultural practices with direct climate impact in order to receive the greening part of the direct payment

Agricultural practices	Objective	Effect on mitigation
Crop diversification	Mainly intended to improve soil quality	The measure causes different crops to be grown than would otherwise have been the case. If this leads to longer rotations,

		increased soil organic matter may result. The introduction of legumes in place of crops which require mineral N is likely to reduce nitrification and emissions of N2O
Maintaining existing permanent grassland	Maintaining carbon stocks/reducing losses	Restricts farmers' ability to convert permanent grassland. If this results in such grassland not being ploughed at all then release of soil CO2 is avoided and on grasslands which are sinks it enables sequestration to continue.
Maintaining an 'ecological focus area' of at least 5% of the arable area of the holding on farms with more than 15 hectares of arable land (e.g. fallow land; afforested areas and landscape elements; Nitrogen-fixing crops).	To safeguard and improve biodiversity on farms	Change of soil carbon stock and biomass above ground via sequestration, as well as reducing the loss of soil organic carbon through erosion. Nitrogen-fixing crops reduce the mineral N requirement of the following crop.

In addition, cross-compliance requirements apply to all components of direct payments covering both statutory management requirements (SMR) as laid down in EU directives and regulations and Good Agricultural and Environmental Conditions (GAEC) as specified by each Member State. The GAEC requirements in Greece are specified in MD 1791/74062/2-7-2015 and the climate-related ones are summarised in the next table.

Table 27 GAEC requirements in Greece are specified in MD 1791/74062/2-7-2015

Agricultural practices	Objective	Effect on mitigation
Measures for the proper use of synthetic and organic fertilizers	Protect groundwater from pollution	Reductions in N application are likely to reduce direct and indirect emissions of N2O. Reduced pollution of groundwater reduces risk of damage to wetland carbon sinks
Measures for protection of soil carbon and Retention of landscape features)	Maintain and enhance soil carbon	Reduction in loss of soil carbon through erosion at sites particularly vulnerable to erosion; Protection of biomass landscape features is likely to help conserve/enhance soil carbon stock as well as protecting the landscape feature itself. Protection of these and non-biomass landscape features (e.g. walls) may reduce the loss of soil carbon through erosion; Avoided CO2 emissions from burning

Maintaining existing permanent grassland	Maintain ratio of permanent grasslands to the total of agricultural area	Restricts farmers' ability to convert permanent grassland.

Further, as an indirect effect, the disengagement of subsidies from the agricultural production has enhanced the reduction of agricultural production and livestock population.

However, the effect of the greening component of direct payments and the climate-related component of cross-compliance requirements cannot easily be correlated since their impact is going to be identified in the medium and long term period. On the other hand, an integrated control mechanism has been established for the monitoring of the implementation of the requirements for the direct payments, including their green part and the environmental and climate related part of the cross-compliance. The control mechanism acts as a safeguard of the maintaining and application of climate friendly practices by farmers

The mitigation effect of Pillar I measures, which is related to carbon storage and sequestration, has not been estimated and was not reported in the BR4. On the other hand, the mitigation effect that is related to the application of "good practises" in fertilizers' use and disengagement of subsidies from the agricultural production was reported. The estimation of the effect is based on expert judgement and conclusions extracted by the comparison of the evolution of GVA of agriculture and the decreasing trend of GHG emissions and associated activity data.

Pillar II – rural development plans

Support for rural development policy (Pillar II) is co-financed by the EAFRD and national or regional budgets. The EAFRD defines six EU level priorities of which every RDP must address at least four and also cross-cutting objectives of innovation, environment and climate mitigation and adaptation. Priority 5, which has 5 Focus Areas, explicitly addresses resource efficiency and the transition towards a low carbon and resilient economy:

- ✓ 5A Increasing efficiency in water use by agriculture
- ✓ 5B Increasing efficiency in energy use in agriculture and food processing
- ✓ 5C Facilitating the supply and use of renewable sources of energy, of by-products, wastes and residues and of other non-food raw material, for the purposes of the bio-economy
- ✓ 5D Reducing greenhouse gas and ammonia emissions from agriculture
- ✓ 5E Fostering carbon conservation and sequestration in agriculture and forestry

The Greek RDP contains measures that fall under all 5 focus areas. 5A is related mainly to adaptation measures to Climate Change (e.g. measures related to water savings); 5B and 5C are related to energy efficiency and investments in RES. Their mitigation effect and progress is reported aggregately under the energy sector in the BR4. 5D includes measures that reduce CH4, N2O and NH3 emissions from agriculture sector, namely organic farming, measures to reduce or rationalize fertilizer application, measures in livestock management to reduce emissions. 5E refers to carbon conservation and sequestration measures in agriculture and forestry.

Apart from the above-mentioned measures, the RDP includes a number of measures, such as knowledge transfer and information actions; and advisory farm management and relief services, which is expected to contribute to the diffusion of practices beneficial to climate mitigation and adaptation.

The progress of the implementation of the RDP climate-related components is monitored by a group of outcome indicators (see next table).

Table 28 Outcome indicators to monitor the progress of the implementation of the RDP climate-related components

Focus area	Code of indicator	Title of indicator	Target for 2023
5A	R12/T14	% of irrigated land switching to more efficient irrigation systems	4.97 %
5B	T15	Total investments in energy saving and efficiency	27.722.264 €
5C	T16	Total investments in renewable energy production	74.763.524 €
5D	R16/T17	Livestock units (LU)[28] concerned by investments in livestock management in view of reducing GHG and/or ammonia emissions	180 LU
5D	R17/T18	Agricultural land under management contracts targeting reduction of GHG and/or ammonia emissions	133.965 Ha

[28] The **livestock unit**, abbreviated as **LSU** (or sometimes as **LU**), is a reference unit which facilitates the aggregation of livestock from various species and age as per convention, via the use of specific coefficients established initially on the basis of the nutritional or feed requirement of each type of animal (see table below for an overview of the most commonly used coefficients).

5E	R20/T19	Agricultural and forest land under management contracts to foster carbon sequestration/conservation	46.766 Ha

For the implementation till 2018, the indicators of *Table 28* for the focus areas 5A and 5E are 4.49% and 16.280 ha respectively.

The mitigation effect of Pillar II measures (RDP), which is related to carbon storage and sequestration (focus area 5E), has not been estimated. On the other hand, the mitigation effect that is related to organic farming and management of land targeting GHG reduction was reported in the BR4. The estimation of the effect of organic farming is analogous to the annual increment of the land under organic farming. In addition, the effect of measures to keep agricultural land under management contracts targeting reduction of GHG emissions is based on expert judgement and conclusions extracted by the comparison of GVA evolution of agriculture and the decreasing trend of GHG emissions and associated activity data.

The next table presents the impact of CAP in GHG emissions reduction in ktCO2eq for 2015 (ex-post) and 2020-2035 (ex-ante estimation). The effect is estimated as described above (Pillar I and II). The mitigation effect of actions targeting carbon storage and sequestration and energy efficiency and RES is not included, as explained above.

Table 29 Impact of CAP in GHG emissions reduction (ktCO2eq)

Action / Year	2015	2020	2025	2030	2035
Reduction in Fertilizers use (N_2O)	100	120	150	200	230
Organic farming (N_2O)	160	220	300	350	410
Reduction of the rate of intensity of agricultural land use and improvement of management of animal waste. (CH4, N2O)	300	375	550	750	1000
Total	**560**	**715**	**1000**	**1300**	**1640**

4.1.3.6 Sectoral policies and measures: Waste (mitigated GHGs: CH4 and N2O)

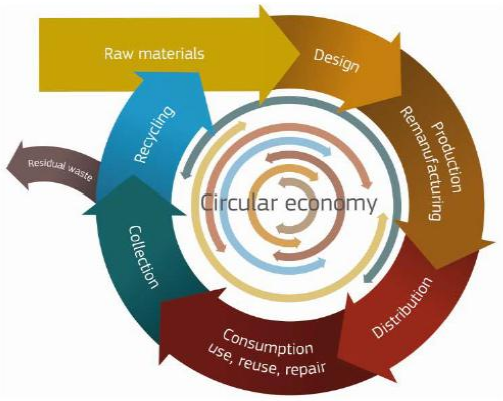
Policies and measures relating to solid waste disposal, biological treatment of waste, waste incineration and open burning of waste, as well as wastewater treatment and discharge, are climate relevant. Important GHGs in this sector are CH4, which mainly arises from the treatment and disposal of solid waste, and N2O originating from waste water. In addition, a substitution of primary raw materials by secondary raw materials coming from recycling allow for significant GHG savings due to lower demand for energy needed to extract raw materials and turn them into products.

4.1.3.6.1 From waste management to a circular economy

The EU's Circular Economy Action Package was adopted in December 2015. The circular economy package goes beyond waste management alone, by addressing the whole life cycle of resources and products, in order to close the loop. This means dealing with production processes, material and product design, consumer and buyer information, distribution and retail to stimulate waste prevention by increased re-using, repairing, refurbishing and also by recycling existing materials and products to minimize the residual waste, ideally leading to a zero waste society. The strategy sets out a number of priority issues, including plastics, food waste, critical raw materials, construction and demolition, biomass and bio-based products, innovation and investment and monitoring progress.

The Ministry of Environment and Energy of Greece has already made a number of institutional interventions, which are in line with the principles of circular economy: (a) The revised National Waste Management Plan (which has been approved and published on 15-12-2015 with the Act no. 49 of Ministerial Council "Amendment and approval of the National Waste Management Plan and the National Strategic Plan for Waste Prevention, ratified according to the 51373/4684/25−11−2015 Joint Ministerial Decision") foresees that 50% of the waste (recyclable and biowaste) will be recovered by recycling and reuse at local level; (b) the development of regional waste management plans (all thirteen have been approved); (c) the financing of projects involving the remaining 50%, with provision for the recovery of resources, energy and secondary materials; (d) the recent amendment of the law about the alternative management of packaging waste and other products (Law 4496/2017); (e) the National Circular Economy Strategy (December 2018), and (f) the application of the principle "pay as you throw" {JMD 31606/930/2019 (GG 1277 B) regarding the pricing policy of the Waste Management Organizations (operating at regional level) was issued in April 2019 after public consultation,

setting the general pricing rules for determining the contributions and fees paid by municipalities to Waste Management Organizations per service offered}.



Source: European Commission.

Figure 7 Main phases of a circular economy model

4.1.3.6.2 Waste to landfill - Management of biodegradable waste

With Decision 50910/2727/2003 and Law 4042/2012 and more specifically the National Waste Management Plan (2015), the measures, the terms and the processes for the rational management of waste in national and regional level have been specified.

According to the National Waste Management Plan (2015), the national policy for waste, taking into consideration, among others, waste hierarchy as set in the Directive 2008/98/EC, is formulated in order to achieve the following goals for the year 2020: (i) waste generation per capita shall be reduced drastically, (ii) the preparing for reuse and recycling including separate collection of recyclables – biowaste shall reach 50 % of total produced municipal waste, (iii) energy recovery shall be chosen as a supplemental / final solution when the application of the remaining recovery operations is not possible and (iv) landfill shall be the last choice of waste management whereas landfilled waste shall be reduced at 30% of the total municipal waste generation.

Landfills shall comply with the requirements of Directive 1999/31/EC on the landfill of waste, which has transposed to Greek legislation by JMD 29407/3508/2002. The objective of the Landfill Directive 1999/31/EC is to prevent or reduce as far as possible negative effects on the environment resulting from the landfilling of waste –including emissions of GHG – by introducing stringent technical requirements for waste and landfills. Recently, Directive 1999/31 / EC on the landfill of waste was amended by the Directive (EU) 2018/850.

Biodegradable waste is of interest in terms of GHG emissions, as this is the waste fraction delivering most CH4 emissions during anaerobic decomposition. The necessity to reduce the quantities of biodegradable waste going to landfills is acknowledged by Joint Ministerial Decision 29407/3508/2002 in agreement with Directive 1999/31/EC. Within the framework of the national strategy for the reduction of biodegradable waste, as reviewed according to the National Waste Management Plan (2015), Greece has the target to limit the biodegradable waste going to landfills in 2020 to 35% of the biodegradable waste produced in 1997, while with the Directive (EU) 2018/850 for the amendment of Directive 1999/31 / EC on the landfill of waste, it is targeted only the 10% of generated municipal solid waste to be landfilled by 2035. The implementation of this Directive, i.e. (EU) 2018/850, is expected to contribute in the reduction of GHG emissions (CH4) at approximately 0.5 Mt CO2eq, 0.9 Mt CO2eq, 1.3 Mt CO2eq and 1.7 Mt CO2eq in 2020, 2025, 2030 and 2035, respectively. The reduction of biodegradable waste landfill is enhanced by the directive for Packaging and Packaging Waste (94/62/EC) regarding Paper/Cardboard recycling.

The Landfill Directive requires, also, the collection of landfill gas from all landfills receiving biodegradable municipal waste. The flaring of landfill gas in all managed sites for urban centres with population more than 100,000 is partially an integrated measure. Already, the managed disposal sites serving the population of the largest cities of Greece are equipped with systems for the collection or for the flaring of biogas. The flaring or the recovery of biogas in SWDS is expected to contribute to the reduction of GHG emissions (CH4) by 0.5 Mt CO2eq, 0.6 Mt CO2eq, 0.7 Mt CO2eq and 0.7 Mt CO2eq for the years 2020, 2025, 2030 and 2035.

4.1.3.6.3 Urban Waste Water Treatment

As regards wastewater, a collection network with its corresponding wastewater treatment plants has already been developed during the last five-years, covering the needs of 70% of the population in 2001 and the 91% in 2015, in compliance with the Directive 91/271/EEC concerning the collection, treatment and discharge of the urban wastewater. In the Psyttalia wastewater treatment plant that serves approximately 4 millions of Attica population, a part the sludge produced is treated under anaerobic conditions resulting in the production of biogas. The biogas produced covers the energy needs of the wastewater treatment facilities, while the surplus is flared.

Finally, the implementation of Directive 86/278/EEC for the use of sludge in agriculture is in force, however until 2012 only a minor amount of sludge is used in agriculture (about 0.04% of produced sewage sludge) on the frame of research projects and pilot studies. Nevertheless an increase in the quantity of sludge in agriculture is observed for the period 2013 - 2017 (about 20% of the dry produced sewage sludge).

4.1.3.6.4 Policies targeting waste streams

In this section policies are grouped together which target different waste streams; the GHG reduction potential may become apparent only in the overall life-cycle where emissions are avoided during production or due to smaller amounts of waste.

The Directive 94/62/EC established the general principles of the European Union on packaging and packaging waste. This directive was incorporated into national law by Law 2939/2001 which lays down recycling targets per waste stream and introduces the obligatory participation of the parties responsible (packaging producers) in alternative waste management systems (extended producer responsibility principle). In Greece, the most known packaging waste recycling system is the system of placed nationwide blue bins, but there are other systems as well with small recycling kiosks. The materials recycled are plastic, glass, aluminum, paper and cardboard, tinplate and wood. The Producer Responsibility Organisation-PRO (widely known as Alternative Waste Management System) of Packaging "HERRCO – Hellenic Recovery Recycling Corporation started its operation in 2003 by placing blue recycling bins. The packaging recycling systems have since grown and noted a steady increase in the geographical range, the number of contracted producers and the amount of packaging recycled.

The particular problem of plastic waste is addressed by a Green Paper (COM(2013) 123 final) and a Proposal for an amendment to the Directive 94/62/EC to reduce the consumption of lightweight plastic carrier bags (COM(2013) 761 final). On 28 April 2015, the European Parliament approved of such an amendment that will require EU Member States to either reduce annual average consumption of lightweight plastic bags per citizen, or to ban the handing-over of free bags (Directive (EU) 2015/720). In Greece, as of 1 January 2018, consumers are required to pay an environmental fee per piece of lightweight plastic carrier bag (Law 4496/2017 and JMD 180036/952/10.8.2017 (OJG 2812 B)). The charge is set as from 1 January 2018 at three (3) cents of euro and from 1 January 2019 to seven (7) cents.

The Directive on Waste of Electrical and Electronic Equipment (WEEED) 2012/19/EC, as transposed into national legislation by JMD Η.Π.23615/651/Ε.103/2014 (OGG 1184 B) and amended by JMD 36928/2227/2018 (OGG 5459 B) requires Member States to take measures to encourage producers to design and produce electrical and electronic equipment which take into account and facilitate dismantling and recovery. Moreover, it sets ambitious collection targets in order to minimize the disposal of WEEE in the form of unsorted municipal waste. It also sets targets for re-use and recycling as well as targets for recovery of WEEE to ensure the correct treatment of all collected WEEE. In Greece, for the year 2016 the annual waste electrical and

electronic equipment is estimated at 100,000 tons. Waste electrical and electronic equipment has been identified by the Greek legislation as a priority waste stream, due to the dangerous nature of growth in the volume and the significant impact caused by the production of electrical and electronic equipment in the environment. According to the revised National Waste Management Plan, from 2019, the minimum collection rate is set at 65% of the average annual weight of the Electrical and Electronic Equipment placed on the market in the previous three years or alternatively in 85% of the Waste Electrical and Electronic Equipment produced by weight.

The End-of-Life Vehicles Directive (ELVD) 2000/53/EC aims to reduce the amount of waste produced from vehicles when they are scrapped and to increase re-use, recycling and other forms of recovery of end-of-life vehicles and their components. The Motor Vehicles Directive 2005/64/EC sets very high targets for re-use, recycling and other forms of recovery of end-of-life vehicles and their components so as to reduce the disposal of waste as well as to improve the environmental performance of all economic operators involved in the life cycle of vehicles. Further, it sets provisions on the type-approval of motor-vehicles with regards to their reusability, recyclability and recoverability. In Greece, after the launch of the system of Alternative Vehicle Management Association (EDOE) in December 2004, the rate of recycling of ELVs has shown an upward trend. Apart from private owners of old cars, local government agencies have been active and have fully contributed to the removal of abandoned old cars from the streets of the cities. The recycling system of EDOE collaborates with other collective recycling systems, where materials are delivered as oil, tires, batteries and other hazardous waste delivered to hazardous waste management companies. A percentage, almost 75% of ELVs consists of useful metals that are recycled in their respective industries. Finally some parts are sold as used parts (reuse). The national institutional framework for ELVD is governed by PD 116/2004, JMD 186921/1876/30-10-2016 as amended by JMD 31068/1952/2018 (OGG 2783 B). Under the Presidential Decree 116/2004, quantitative targets for recycling vehicles have been set to 85% for vehicles produced after 1/1/1980 and to 75% for vehicles produced before 1/1/1980. Production date is considered the issue date of the first license. These objectives were increased to 95% reuse and recovery irrespective of the year of production.

The Battery Directive 2006/66/EC provides, inter alia, targets for collection and recycling and establishes rules for treatment and disposal of batteries and accumulators. In Greece, in 2017 around 1,700 tons of portable batteries are placed into the market, and around 570 tons of waste portable batteries are collected corresponding to 34% collection rate. The national institutional framework for used batteries is governed by IMD 41624.2057.E103/2010 and JMD 39200/2015 (OGG 2057 B).

There are three additional waste streams already covered by the national institutional framework for alternative management:

- Waste Lubrication Oils - WLO (PD 82/2004). In Greece it is estimated that 60% of oils available in the market becomes waste.
- Used vehicle tires (PD 109/2004). In Greece, a collective tire recycling system operates since 2004, nationwide since 2006. Currently, the collection of used tires exceeds 95% of used tires in the country (36,307 t in 2016), of which 55% was recycled and 40% were utilized for energy recovery.
- Construction Demolition and Excavation Wastes - (JMD 36259/1757/E103/2010).

4.1.3.7 Sectoral policies and measures: LULUCF sector (mitigated GHGs: CO2)

The Presidential Decree of 19-11-1928 "On forest management, felling regulations, forest taxation and rent, disposal of products, resin collection and resin cultivation etc." regulates legislatively the sustainable forest management. By this decree, the principle of sustainability is adopted in its simple form, i.e. sustainable yield. However, the management of Greek forests based on sustainable yield started after the Ministry of Agriculture issued circular No 120094/499/1937. Furthermore, the Administrative Regulation No 10223/958/1953 "Guidelines for the Implementation of Forest Management Plans in State and Private Forests", which has been revised twice (Ministerial Decisions 158072/1120/1965 and 81701/3908/1991) and the Legislative Decree No 86/1969 set very strict regulations regarding forest management for both the public and private forests. Law 998/1979 "On the protection of the country's forest and other wooded land" determines the specific protection measures concerning maintenance, development and improvement of country's forests and other forested lands. According to that legislative framework, forest management is applied following specific rules and guidelines for practices driven by the fundamental principle and predominant goal of preserving and promoting the "sustainability" of forests in terms of their provision of products, growing stock and services. In addition, recently the technical specifications for forest and forest area studies have been recently revised (Ministerial Decision 166780/1619/ 19.04.2018) to include inter alia climate risk provisions.

Pursuant to Article 24 of the Greek Constitution land use changes of forests are prohibited unless it is required for public interest. Thus, deforestation activities are limited and permitted only in specific cases for the public interest and benefit (e.g. construction of roads, railways, high tension

lines), following direct administrative procedures under the provision of Greek laws (Legislative Decree No 86/1969, Law No 998/1979, 1734/1987), before being authorized by the Forest Service which is the responsible authority. Any other temporarily loss of forest cover is not considered as deforestation and is declared instantly reforested following specific administrative procedures under the provisions of Greek laws (art. 61 Legislative Decree No 86/1969, art. 37, 38, 46, 47 Law 998/1979) in order to recover in its former state.

Forests, apart from products, provide numerous environmental and social services and the aim should be to preserve and strengthen those services, such as maintaining and enhancing biodiversity, to increase their contribution to the mitigation of climate change, along with strengthening their resilience to the impacts of climate change, to increase their contribution to the protection of water and soil and air purification etc.

The measures for the LULUCF sector arise from rural development actions and other financial mechanisms. In the overall Greek fiscal deficiency, policies already implemented, adopted and measures taken aim for the above-mentioned targets achievement. For the period 2013-2020, the relevant measures, being implemented aim primarily at protecting forest lands, their sustainable management, preserving and strengthening their multifunctional role, contributing also to the mitigation of the climate change and the development of forestry sector. Those policies and measures are presented divided into the following broad categories:

- Public Investment Program – Forest Sector:

In the context of the Public Investment Program, the actions included in the following projects of the Collective Project Decision (SAE) 0584 continue, with registered credits of 3.765.500,00 € in 2018 (the fund allocation for their implementation is subject to the yearly appropriations allocated by the Ministry of Economy and Development and there is no time limitation for their validity):

- Fire protection of public forests and wooded lands (Opening - maintenance - improvement of forest roads): Preventive actions are funded aiming at decreasing fuel availability, diversification of forest structure, silvicultural interventions (e.g. logging) in coniferous forests to remove flammable biomass, etc.;
- Forest Studies: This project includes actions in relation to the development or updating of forest management plans, ensuring forest conservation, landscape protection and biodiversity conservation, the sustainable harvesting, as well as to the preparation of fire plans for the management of forest fires;
- Management of Public Forests: Several actions are included such as the conversion of public degraded coppice broadleaf forests in high forests; restoration of the structure and composition

of forest ecosystems to approximate natural mixed forests structure; enhancement and protection of regeneration, enhancement of biodiversity, increase of the adaptability to climate change; installation, maintenance and improvement of permanent sampling plots to monitor ecological parameters, biotic and abiotic factors for the assessment of the climate change impacts; undertaking necessary adaptive management measures; removal of non-native and invasive species; planting of broadleaf species to improve water quality (e.g. in acidic soils covered by coniferous forests);

- Cultivation of public forest nurseries, seed gathering and management of seed gardens and clusters: This project includes actions for the cultivation of Public Forest Nurseries, seed gathering, with the goal of ensuring qualitative planting material for successful afforestations;
- Maintaining the health and vitality of forest ecosystems-Effective application of the Community plant health regime: Within this project, the necessary actions to combat insects and fungi and any pathogenic causes in application of the relevant obligations arising from national and EU phytosanitary control legislation, Commission implementing decisions on urgent measures for pests organisms spread are promoted;
- Systematic and intensive forest health monitoring in Greece within the framework of the world forest organization - ICP FORESTS: The project consists of two sub-projects:
  - ✓ The first, of "Systematic Surveillance of Level I" (implemented by the local Forest Services) consists of assessing the health of 100 experimental surfaces designated and representing all forest ecosystems of the country. Forest health is estimated by the degree of defoliation of trees and by the identification of biotic and abiotic factors (e.g. fungi attacks, insects, extreme meteorological phenomena);
  - ✓ The second, of Level II is implemented by the Institute of Mediterranean Forest Ecosystems (EL.G.O. DIMITRA) and includes 4 experimental surfaces representative of Greek forest ecosystems and where intensive monitoring and measurement of many ecological parameters is performed so that conclusions can be drawn between cause and effect in forest ecology.

➢ Regular Budget of the Ministry of Environment and Energy – Special Body Φ 31-130 "Forest Services"

With this instrument, finance is provided to cover the costs of the smooth performance of the General Directorate of Forests and Forest Environment (GDFFE), and most of the appropriations are transferred to the budget of the Decentralized Administrations mainly to cover the costs of implementing the annual Forest Protection Program, prepared annually by the competent Directorate of Forest Protection (3,430,000.00 € for 2018).

The aim of the program is to effectively protect forests, and their fauna from all threats, especially by fires, illegal hunting, as well as the control of illegal logging, but also the achievement of the patrolling of the rural environment and the implementation of reforestation works.

- Special Body of Forests/SBF (Green Fund)

Each year the Forest Service develops the forestry funding program with appropriations from the SBF which is submitted for approval by the Minister of Environment and Energy, following the respective decision from the "Green Fund" board. This program finances mainly the regional and local Forest Services to take appropriate measures and actions for the sustainable management and protection of forest ecosystems and which are described, analyzed and specified in priority axes. The measures and actions implemented, aim at the protection of forests and wooded lands from any danger from which they are threatened, and in particular from fires, the combat chestnut ulcer (vaccinations), the protection of wild fauna and its habitats, the monitoring for the compliance with hunting rules, the improvement of ecological and social value with the organization of all day accommodation spaces and outdoor recreation and in general facilitating forest recreation, the restoration of forestry productive potential damaged by natural disasters, etc. The budget for the year 2018 amounted to 10,000,000.00 €, and indicative actions and measures that have been funded are:

- ✓ Preventive measures for the fire protection of public forests and wooded lands;
- ✓ Forest studies development: This measure includes expenditures for the development of forest management plans for the public and private forests, for the purpose of organizing forestry and ensuring the maintenance and conservation of forests, and their sustainable management as described in the relevant provisions of Law 86/1969.
- ✓ Improvement of infrastructures, prevention of illegal logging: Includes preventive measures (forest surveillance, patrols, vehicle control) by the Forest Services, which are included in the "Special Prevention Program for Illegal-logging" annually compiled by the competent Directorate of Forest Protection;
- ✓ Restoring forest potential: The objective of measures and actions of this axis is to restore the ecological and productive value of forests damaged by fires with the implementation of appropriate forestry projects such as log-, branch-barrier, reforestations as well as the restoration of the landscape and forest vegetation of disturbed areas from human-induced interventions (e.g. fire protection works, anti-corrosion and flood defense projects, construction of water tanks for forest fire prevention and restoration);
- ✓ Support of forest protection;

- ✓ Landscape and forest vegetation restoration: Includes the implementation of projects and works, based on approved rehabilitation studies for disturbed areas which have been affected by operations related to quarries, road construction works, with the objective of their landscape restoration;
- ✓ Applied research: Within this axis research programs of general forestry interest that will help to achieve the objectives of the forest policy and to serve the forestry action by implementing programs whose results are directly applicable are funded. Such programs are "The treatment of the disease of the post-chromatic ulcer of the Platanus trees in the Greek area" by EL.G.O. DIMITRA; "Creation and Pilot Operation of National Forest Fire Observatory - Development of indicators, products and services related to the prevention of forest fires as well as the assessment of these impacts", by Aristotle University of Thessaloniki; Road Map for the certification of the sustainable management of Greek forests and wood products - Creation of the National Certification System, by EL.G.O. DIMITRA;
- ✓ Costs of development, supplementing and correcting of forest maps (in the context of the National Cadastre Project);

➢ Actions - projects under the Rural Development Program (RDP) 2014-2020

In the RDP for the period 2014- 2020 the following forestry measures and actions are included:

- Measure 8 «Investing in the development of forest areas and the improvement of forest sustainability».
  - ✓ Sub-measure 8.1 «support for afforestation/creation of forested areas»: This sub- measure foresees the afforestation of agricultural land and non-agricultural land, with priority to areas located in areas of high risk of erosion, in areas where it helps in achieving the management goals for the areas under protection under Article 6 of Directive 2000/60/EC, in zones occupied by irrigation, drainage and flood-defense works and in vulnerable to desertification areas. Afforestations will contribute to the protection of the environment, the expansion and improvement of forest resources and hence the enhancement of anti-errosion, flood protection and fire protection, biodiversity conservation, climate change mitigation and adaptation, regulating the quality and quantity of water, enhancing natural regeneration in certain areas;
  - ✓ Sub-measure 8.2. «Aid for agroforestry systems»: Includes two actions, one for agroforestry systems and one for forest-grassland systems;

- ✓ Sub-measure 8.3 «Prevention of damages to forests from forest fires, natural disasters and catastrophic events»: Includes forests prevention actions against biotic and abiotic threats, in particular fires, pathogens and floods. It covers indicatively the costs for the construction and/or maintenance of infrastructures (forest paths and forest roads, water supply points, maintenance and improvement of the water supply network, diversification of the forest structure using less flammable forest species); the installation and/or improvement of equipment and monitoring systems for pathogens, including the network of sampling plots; specific silvicultural operations to prevent the spread of pathogens in accordance with the protection measures deriving from the national/EU legal framework (e.g. cutting, burning, removal of trees); construction of anti-corrosion and flood protection projects to prevent floods and soil erosion;
- ✓ Sub-measure 8.4 «Forest restoration caused by forest fires, natural disasters and catastrophic events»: The sub-measure includes reforestation actions for restoring forest potential damaged by fires, natural disasters and catastrophic events or degradation from other causes such as soil erosion. It also comprises the mountainous anti-corrosion and flood protection projects. Restoration of forestry infrastructures or forestry investments from damages as a result of other than the above-mentioned causes may be implemented according to the specifics of the forest area or the management regime;
- ✓ Sub-measure 8.6 «support for investment in forestry technologies and in processing, distribution and marketing of forest products»;

- Measure 12 «Aid under the Natura 2000 framework and the framework directive on water».
  - ✓ Sub-measure 12.2 «compensation for forest areas of Natura 2000 network»: Includes compensation to private forest managers (forest owners) or their associations for loss of income due to the implementation of specific measures to conserve biodiversity in NATURA 2000 sites;

➢ RDP 2007-2013 transferred actions

A number of measures/actions from the previous programming period 2007-2013, which were not completed or the completion reports were not issued, have been transferred:

- Measure 125B " Opening and improvement of forest road network";
- Measure 226 "Rehabilitation of Forest Resources and Introduction of Prevention Actions":
  - ✓ Action 1: "Improvement of prevention conditions for the fire protection of forests that have been destroyed mainly by fires";
  - ✓ Action 2: "Mountainous flood and anti-corrosion projects to prevent flood impacts";

- ✓ Action 3: "Reforestation - Mountainous flood protection and anti-corrosion rehabilitation works of fire affected areas".

➢ Other projects

- The Greek Ministry of Environment and Energy has the overall responsibility for the elaboration and development of the National Forest Map project under the national Cadastre Survey. The development of Forest Maps involves the delineation and recording of forest lands that fall under the protective provisions of Greek forest legislation in an accurate, transparent and definitive way.
- There are also a few projects under implementation in the context of the LIFE Regulation, in which various Greek bodies are participating and the results of which are expected to provide valuable information in relation to LULUCF aspects and the climate change combat:
  - ✓ Olive-Clima (LIFE11 ENV/GR/000942): The objectives are to identify farming practices leading to carbon sequestration; to reduce GHG emissions and other environmental impacts during crop production; to develop a set of indicators to link farming practices to quantifiable carbon storage; to provide methodologies for farmers (duration 01.10.2012-30.09.2017);
  - ✓ Climatree (LIFE14 CCM/GR/000635): The objectives are to define an accounting and monitoring framework for tree-crops CO2 sequestration; to develop a software application for the accounting of carbon sequestration by tree crops; to promote its adoption by EU and National Authorities; to delineate mitigation practices in the agricultural sector (duration 16.07.2015-28.06.2019);
  - ✓ Foresmit (LIFE14 CCM/IT/000905): The objectives are to define guidelines of good silvicultural practices for the restoration of per-urban coniferous forests with native broadleaved species; to test and verify in the field effectiveness of different management options; to provide data on vegetation structure, biomass increment, carbon accumulation in all relevant pools of vegetation and soil, and CO2 and other greenhouse gas emissions, thus giving a complete picture of mitigation potential of management practices (duration 01.09.2015-31.08.2019);

Furthermore, it should be mentioned, that with Law 4414/2016 (OGG A’149) Greece adopted the first National Strategy for Adapting to Climate Change/NSACC (http://www.ypeka.gr/LinkClick.aspx?fileticket=crbjkiIcLlA%3d&tabid=303&language=el-GR, available in Greek only, for the time being). In the NSACC, a special focus is given to agriculture and forestry sectors with regard to the sectoral policies for adaptation to the impacts of climate change. In this context, a series of actions and measures by sector are listed providing the general

strategic and guidance orientation. In a further stage, it is expected that the definite selection, prioritization, and the timetable scheduling of the specific actions and measures will be conducted through the Regional Plans for Adapting to Climate Change, in each of the thirteen Regions of Greece. The primary role of the NSACC of course is to contribute to the increase of the country resilience to climate change. However, the synergies between adaptation and mitigation actions are also strengthened through the preservation and sustainable use of land resources, and land management practices.

Moreover, recently, with the Ministerial Decision 170195/758/2018, the National Forest Strategy (NFS) has been published (Official Governmental Gazette, 5351/B/28.11.2018). The NFS defines the principles and guidelines of forest policy for the period 2018-2038, identifies specific objectives of this policy as well as the necessary resources and the means of its implementation. It endorses also the "Mediterranean forestry model" in Greece's management of forest ecosystems, adapted to the living and abiotic conditions of Greece, implemented at national and regional level, with clear technical and economic planning, increased flexibility, which will strengthen the multifunctional role of forest ecosystems and identify their key features. Articles 5 and 6, define the three Horizontal and four Vertical Axis, respectively, with their general objectives, action directions and monitor indicators. Climate Change is the second vertical axis, while the NFS stresses the obligation for interconnecting with relevant national, international and European strategies for forest ecosystems (art. 8). It promotes: forest ecosystem climate change vulnerability assessments; management to adapt forest ecosystems to climate change; land use and land use change policies to preserve forest ecosystems services (i.e. microclimate, water detention, soil protection); increase of carbon sequestration; maintenance of forest land coverage and connectivity to preserve habitants and biodiversity; afforestation and restoration of degraded forests; assessment and management of Greek forest genetic diversity; and use of climate resilient genetic material. The implementation of the NFS will take place through the Forest Action Plan (FAP). The implementation of the FAP is the responsibility of the MEE, as well as of the involved Ministries and Bodies, however in any case, the Central Forest Service has the overall coordination and supervision of the NFS and FAP implementation. The timeframe of the NFS and FAP is set at 20 years (2018-2038). Until the final assessment and review of the NFS and FAP in 2037, a mid-term assessment is foreseen with the possibility of a complete revision within the decade (2028) and further mid-term assessment every five years (2023 and 2033) subject to partial revisions. The final assessment of the NFS will be conducted in 2037 in order in the same year to start the process of the next NFS for the period 2038-2058. The next NFS should be

institutionalized by 2038. All assessment and revision procedures are accompanied by public consultation procedures with all stakeholders and society.

4.1.4 Information on changes in domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target.

There were no changes in domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target since the BR3.

4.1.5 Assessment of the economic and social consequences of response measures

The formulation of climate policy in Greece follows EU policy. To ensure that all relevant possible impacts are taken into account, the EU has established processes that assess the economic and social consequences of climate policy measures.

For the development of new policy initiatives through legislative proposals by the European Commission, an impact assessment system has been established in which all proposals are examined before any legislation is passed. It is based on an integrated approach which analyses both benefits and costs, and addresses all significant economic, social and environmental impacts of possible new initiatives (for details please refer to the EU BR as well as chapter 15 of the EU National Inventory Report).

Beyond this internal impact assessment system, procedures for assessing the impacts of EU (climate change) policies on external countries have also been established. Even though there is no explicit dialogue on response measures, the impacts of policy measures implemented by the EU are naturally being discussed within the framework of bilateral and regional cooperation. Such processes are included in various EU cooperation policies and agreements with third countries on a sectoral level, such as for trade agreements, as well as on an overarching political level in regional cooperation with Africa, Asia and Latin America as well as in bilateral relations. This way, it is ensured that the effects of such policies on non-EU countries are taken into account.

The free Trade Agreements that have been concluded between the EU and third countries provide pertinent examples. For instance, the Deep and Comprehensive Free Trade Area (DCFTA) signed between the EU and Ukraine on 27 June 2014, which came into force on 1 September 2017, sets out various processes which enable concerned stakeholders to get in contact with the EU on potential impacts of policies and regulations under the Trade Agreement.[29] These include provisions that allow interested parties to comment on proposed regulations under the agreement. Furthermore, enquiry or contact points are established to respond to questions arising from the application of regulations included in the agreement. Negotiations of similar agreements are taking place between the EU and Morocco, Tunisia and Jordan, among others.

Furthermore, dialogues on impacts of EU policies on third countries take place in the context of the European Neighbourhood Policy (ENP). As the basis for cooperation between the EU and a neighbouring country an Association Agreement is negotiated bilaterally between the two partners. In such an agreement, specific political priorities are set for the country concerned. Following the agreement, actions plans are negotiated between the EU and the respective neighbouring country which include priority areas for cooperation and a specific focus of action for each of these areas for three to five years. In the negotiations of an action plan, the country is able to raise specific issues of concern with the EU. Additionally, in technical discussions within sub-committees established through the Association Agreement (particularly on energy, transport and the environment), targeted exchanges on policy issues and directions for future cooperation at bilateral level take place. Partner countries can ask questions about planned EU initiatives and legislatives at such meetings to technical experts.[30]

The EU is also supporting third countries to effectively implement the Paris Agreement in a manner that unlocks socio-economic opportunities and supports climate objectives, by providing capacity building for partner countries across all regions. For examples, the Africa LEDS project is supporting Low Emissions Development in nine African countries in the context of socio-economic development priorities as stipulated in countries' development visions and strategies. One of the two components of the project focuses on technical capacity building for a strong analytical framework, including modelling, for long-term policy decision making.[31]

[29] For more information see http://ec.europa.eu/trade/policy/countries-and-regions/countries/ukraine/.

[30] For further information on the ENP see http://eeas.europa.eu/enp/.

[31] See http://ufmsecretariat.org/informal-ufm-high-level-conference-on-climate-change/.

4.2 Estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use change and forestry activities

Quantitative information is included in CTF Tables 4, 4(a)I, 4(a)II and 4(b).

Emissions / removals from LULUCF sector are not part of the 2020 target under UNFCCC (QEERT).

Greece will not use any units from market-based mechanisms in relation to its ESD target. The use of units from market-based mechanisms from EU-ETS operators is described in section 3.2.2 of this report.

4.2.1 LULUCF under the Kyoto Protocol

CTF Table 4(a)II presents quantitative information based on the most updated data reported with the 2017 national greenhouse gas inventory submission under the KP.

For the second commitment period of the Kyoto Protocol Greece has not elected any of the elective activities under Article 3, para 4 of the Kyoto Protocol. Therefore, Greece will account for the mandatory activities Afforestation/Reforestation and Deforestation (Article 3, para 3) and Forest Management (Article 3, para 4). Furthermore Greece has decided to account for Article 3.3 and 3.4 of the Kyoto Protocol activities at the end of the commitment period.

The forest management reference level for Greece is inscribed in the appendix to the annex to decision 2/CMP.7, which is equal to -1.830 Mt CO2 per year assuming instantaneous oxidation of HWP. Greece submitted its second Technical Correction of the Forest Management Reference Level, both assuming instantaneous oxidation, and applying the First Order Decay Function for Harvested Wood Products with the latest national GHG inventory submission, providing also all the necessary information. In the table below the relevant quantitative information on the FMRL technical correction is presented.

Table 30 Summary information on the Forest Management Reference Level Technical Correction

Summary Table Forest Management Reference Level Technical Correction		
	Instantaneous oxidation	FOD
	kt CO_2 eq/yr	
FMRL	-1,830	0
$FMRL_{corr}$	-1,742	-1,738
Difference in per cent	-5%	-5%
Technical Correction	88	92
Projected HWP contribution	-	4

With regard to the activity of Afforestation/Reforestation under article 3.3 this includes only cropland areas that have been planting in the context of EEC Regulations.

In Article 3.4 Forest Management activity, only those forests that are managed with a forest management plan started in 1990 or later are included. These forests cover approximately 36% of the total forest land of Greece.

Greece intends to apply the provision to exclude emissions from natural disturbances for the accounting for afforestation/reforestation under Article 3, paragraph 3, and forest management under Article 3, paragraph 4 of the Kyoto Protocol during the second commitment period in accordance with decision 2/CMP.7, annex, paragraph 33, and any relevant supplementary methodological guidance developed by the Intergovernmental Panel on Climate Change and adopted by the CMP and the COP. To that end, all the necessary information on the background level, the margin and the type of disturbances (i.e. wildfires) has been provided with the latest national GHG inventory submission (2017) in accordance with decision 2/CMP.7. All the necessary information can be found in sections 9.4.4 and 9.5.2.1 of the 2017 NIR and the relevant CRF tables.

As far as Article 3.3 activities of KP (Afforestation, Reforestation and Deforestation) are concerned, the net removal potential of Greece is expected to be around 0.5-1.0 Mt CO2 during the years 2013-2020. For forest management activity, it is estimated that under the current forest management practices in Greece, the sink potential during the second commitment period will be approximately 1.7 – 2.2 Mt CO2 per year

5 Projections

5.1 Overview

This Chapter describes a “with measures” (WM) or “with existing measures” (WEM) scenario concerning the national projections of greenhouse gas emissions by sources and their removal by sinks for the years 2020, 2025, 2030, 2035 and 2040. The “with measures” scenario assumes that no additional emission reduction policies and measures are adopted than the existing ones (implemented and adopted).

A “with additional measures” (WAM) scenario is also reported, which reflects the effect of all implemented / adopted and planned policies and measures. This scenario includes the additional policies and measures as specified in the National Energy and Climate Plan (NECP), which was recently adopted by Greece (GG 4893 / 31.12,2019). The NECP constitutes a strategic plan for the Greek Government on Climate and Energy issues and comprises a detailed roadmap for achieving concrete Energy and Climate Goals by 2030. The NECP highlights our country's energy and climate priorities and development opportunities and aims to be the key tool for shaping/mainstreaming the national energy and climate policy over the next decade. More information about the plan were reported in section 4.1.2.1.

The GHG emission projections presented in this chapter are based on the latest official energy projection scenarios that are developed by the Ministry of Environment and Energy.

The projections of GHG emissions of the WM and WAM scenarios disaggregated by sector and by gas are presented in **CTF Table 6(a) and 6(c) (**Table 31**,** Table 32**,** Table 33 and Table 34**)**. In Figure 8, the evolution of GHG emissions (national total, EU-ETS and non ETS) and their projections till year 2040, along with the ESD (2013-2020) and ESR (2021-2030) targets of Greece are presented. In Table 35 a split of the projections of the GHG emissions is presented between the sectors covered and not covered by the EU ETS.

Table 31 CTF Table 6(a) Projection of GHG emissions in the "with measures" scenario, disaggregated by sector (kt CO2 eq)

		GHG emissions and removals								With measures	
GHG emissions projections	Unit	Base Year	1990	1995	2000	2005	2010	2015	2017	2020	2030
Sector											
Energy	kt CO_2 eq	62,363.31	62,363.31	64,363.97	77,814.39	85,239.27	70,601.56	53,924.29	52,912.14	46,654.57	37,116.16
Transport	kt CO_2 eq	14,506.98	14,506.98	16,584.24	18,859.96	21,891.95	22,476.45	17,100.38	17,241.44	17,730.61	17,443.62
Industry/industrial processes	kt CO_2 eq	11,226.96	11,226.96	13,569.65	15,176.41	15,426.20	11,741.12	11,996.39	12,786.81	10,677.82	10,011.86
Agriculture	kt CO_2 eq	10,140.24	10,140.24	9,487.90	9,146.79	8,959.22	8,838.65	7,846.02	7,850.33	8,061.30	9,141.94
Forestry/LULUCF	kt CO_2 eq	-2,107.91	-2,107.91	-2,872.37	-1,941.35	-3,282.91	-3,043.08	-3,719.19	-3,209.10	-1,634.28	-644.79
Waste management/waste	kt CO_2 eq	4,863.82	4,863.82	5,150.20	5,348.87	4,764.61	4,778.71	4,463.30	4,630.06	4,775.91	4,420.92
Other Sectors											
International aviation	kt CO_2 eq	2,496.15	2,496.15	2,658.59	2,547.12	2,622.63	2,606.17	2,893.53	3,463.76	2,874.95	3,409.54
International navigation	kt CO_2 eq	8,359.14	8,359.14	11,807.99	11,861.20	9,436.02	8,992.47	5,949.04	7,150.88	6,454.36	7,302.24
Total with LULUCF [f]	kt CO_2 eq	100,993.41	100,993.41	106,283.60	124,405.08	132,998.34	115,393.41	91,611.18	92,211.69	86,265.93	77,489.71
Total without LULUCF	kt CO_2 eq	103,101.31	103,101.31	109,155.97	126,346.42	136,281.25	118,436.49	95,330.37	95,420.78	87,900.20	78,134.51

Table 32 CTF Table 6(a) Projections of GHG emissions in the "with measures" scenario, disaggregated by gas (kt CO2 eq)

		GHG emissions and removals								With measures	
GHG emissions projections	Unit	Base Year	1990	1995	2000	2005	2010	2015	2017	2020	2030
Gases											
CO_2 emissions including net CO_2 from LULUCF	kt CO_2 eq	81,198.32	81,198.32	84,021.19	100,806.38	110,616.91	94,265.98	71,213.52	71,601.47	66,584.30	57,704.81
CO_2 emissions excluding net CO_2 from LULUCF	kt CO_2 eq	83,375.36	83,375.36	86,945.64	102,982.30	113,925.11	97,342.98	74,959.05	74,844.84	68,288.99	58,420.01
CH_4 emissions including CH_4 from LULUCF	kt CO_2 eq	10,969.48	10,969.48	11,347.00	11,837.78	11,249.61	11,017.62	10,014.01	9,933.37	9,992.69	10,129.39
CH_4 emissions excluding CH_4 from LULUCF	kt CO_2 eq	10,906.80	10,906.80	11,303.62	11,629.75	11,239.07	11,001.20	10,003.21	9,914.82	9,937.58	10,074.29
N_2O emissions including N_2O from LULUCF	kt CO_2 eq	7,449.60	7,449.60	6,691.76	6,372.98	5,956.13	5,506.75	4,259.22	4,366.72	4,606.47	5,013.55
N_2O emissions excluding N_2O from LULUCF	kt CO_2 eq	7,443.14	7,443.14	6,683.06	6,346.44	5,941.37	5,489.25	4,243.70	4,351.00	4,591.17	4,998.25
HFCs	kt CO_2 eq	1,182.82	1,182.82	4,157.38	5,261.86	5,078.03	4,467.76	5,999.84	6,179.32	4,946.90	4,506.29
PFCs	kt CO_2 eq	190.26	190.26	62.85	122.26	91.51	129.44	119.52	125.79	130.00	130.00
SF_6	kt CO_2 eq	2.93	2.93	3.42	3.81	6.16	5.86	5.06	5.01	5.56	5.67
NF_3	kt CO_2 eq	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total with LULUCF [†]	kt CO_2 eq	100,993.41	100,993.41	106,283.60	124,405.08	132,998.34	115,393.41	91,611.18	92,211.69	86,265.93	77,489.71
Total without LULUCF	kt CO_2 eq	103,101.31	103,101.31	109,155.97	126,346.42	136,281.25	118,436.49	95,330.37	95,420.78	87,900.20	78,134.51

Table 33 CTF Table 6(c) Projection of GHG emissions in the "with additional measures" scenario, disaggregated by sector (kt CO2 eq)

		GHG emissions and removals								With additional measures	
GHG emissions projections	Unit	Base Year	1990	1995	2000	2005	2010	2015	2017	2020	2030
Sector											
Energy	kt CO_2 eq	62,363.31	62,363.31	64,363.97	77,814.39	85,239.27	70,601.56	53,924.29	52,912.14	38,987.07	20,393.03
Transport	kt CO_2 eq	14,506.98	14,506.98	16,584.24	18,859.96	21,891.95	22,476.45	17,100.38	17,241.44	17,806.33	16,866.40
Industry/industrial processes	kt CO_2 eq	11,226.96	11,226.96	13,569.65	15,176.41	15,426.20	11,741.12	11,996.39	12,786.81	10,677.95	10,032.64
Agriculture	kt CO_2 eq	10,140.24	10,140.24	9,487.90	9,146.79	8,959.22	8,838.65	7,846.02	7,850.33	8,061.30	9,141.94
Forestry/LULUCF	kt CO_2 eq	-2,107.91	-2,107.91	-2,872.37	-1,941.35	-3,282.91	-3,043.08	-3,719.19	-3,209.10	-1,634.28	-644.79
Waste management/waste	kt CO_2 eq	4,863.82	4,863.82	5,150.20	5,348.87	4,764.61	4,778.71	4,463.30	4,630.06	4,775.91	4,420.92
Other Sectors											
International aviation	kt CO_2 eq	2,496.15	2,496.15	2,658.59	2,547.12	2,622.63	2,606.17	2,893.53	3,463.76	3,151.37	3,474.52
International navigation	kt CO_2 eq	8,359.14	8,359.14	11,807.99	11,861.20	9,436.02	8,992.47	5,949.04	7,150.88	6,485.71	7,512.70
Total with LULUCF [f]	kt CO_2 eq	100,993.41	100,993.41	106,283.60	124,405.08	132,998.34	115,393.41	91,611.18	92,211.69	78,674.28	60,210.14
Total without LULUCF	kt CO_2 eq	103,101.31	103,101.31	109,155.97	126,346.42	136,281.25	118,436.49	95,330.37	95,420.78	80,308.56	60,854.93

Table 34 CTF Table 6(c) Projections of GHG emissions in the "with additional measures" scenario, disaggregated by gas (kt CO2 eq)

		GHG emissions and removals								With additional measures	
GHG emissions projections	Unit	Base Year	1990	1995	2000	2005	2010	2015	2017	2020	2030
Gases											
CO_2 emissions including net CO_2 from LULUCF	kt CO_2 eq	81,198.32	81,198.32	84,021.19	100,806.38	110,616.91	94,265.98	71,213.52	71,601.47	59,255.73	40,808.37
CO_2 emissions excluding net CO_2 from LULUCF	kt CO_2 eq	83,375.36	83,375.36	86,945.64	102,982.30	113,925.11	97,342.98	74,959.05	74,844.84	60,960.42	41,523.58
CH_4 emissions including CH_4 from LULUCF	kt CO_2 eq	10,969.48	10,969.48	11,347.00	11,837.78	11,249.61	11,017.62	10,014.01	9,933.37	9,766.01	9,799.72
CH_4 emissions excluding CH_4 from LULUCF	kt CO_2 eq	10,906.80	10,906.80	11,303.62	11,629.75	11,239.07	11,001.20	10,003.21	9,914.82	9,710.91	9,744.62
N_2O emissions including N_2O from LULUCF	kt CO_2 eq	7,449.60	7,449.60	6,691.76	6,372.98	5,956.13	5,506.75	4,259.22	4,366.72	4,570.07	4,960.14
N_2O emissions excluding N_2O from LULUCF	kt CO_2 eq	7,443.14	7,443.14	6,683.06	6,346.44	5,941.37	5,489.25	4,243.70	4,351.00	4,554.77	4,944.84
HFCs	kt CO_2 eq	1,182.82	1,182.82	4,157.38	5,261.86	5,078.03	4,467.76	5,999.84	6,179.32	4,946.90	4,506.29
PFCs	kt CO_2 eq	190.26	190.26	62.85	122.26	91.51	129.44	119.52	125.79	130.00	130.00
SF_6	kt CO_2 eq	2.93	2.93	3.42	3.81	6.16	5.86	5.06	5.01	5.56	5.62
NF_3	kt CO_2 eq	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total with LULUCF [f]	kt CO_2 eq	100,993.41	100,993.41	106,283.60	124,405.08	132,998.34	115,393.41	91,611.18	92,211.69	78,674.28	60,210.14
Total without LULUCF	kt CO_2 eq	103,101.31	103,101.31	109,155.97	126,346.42	136,281.25	118,436.49	95,330.37	95,420.78	80,308.56	60,854.93

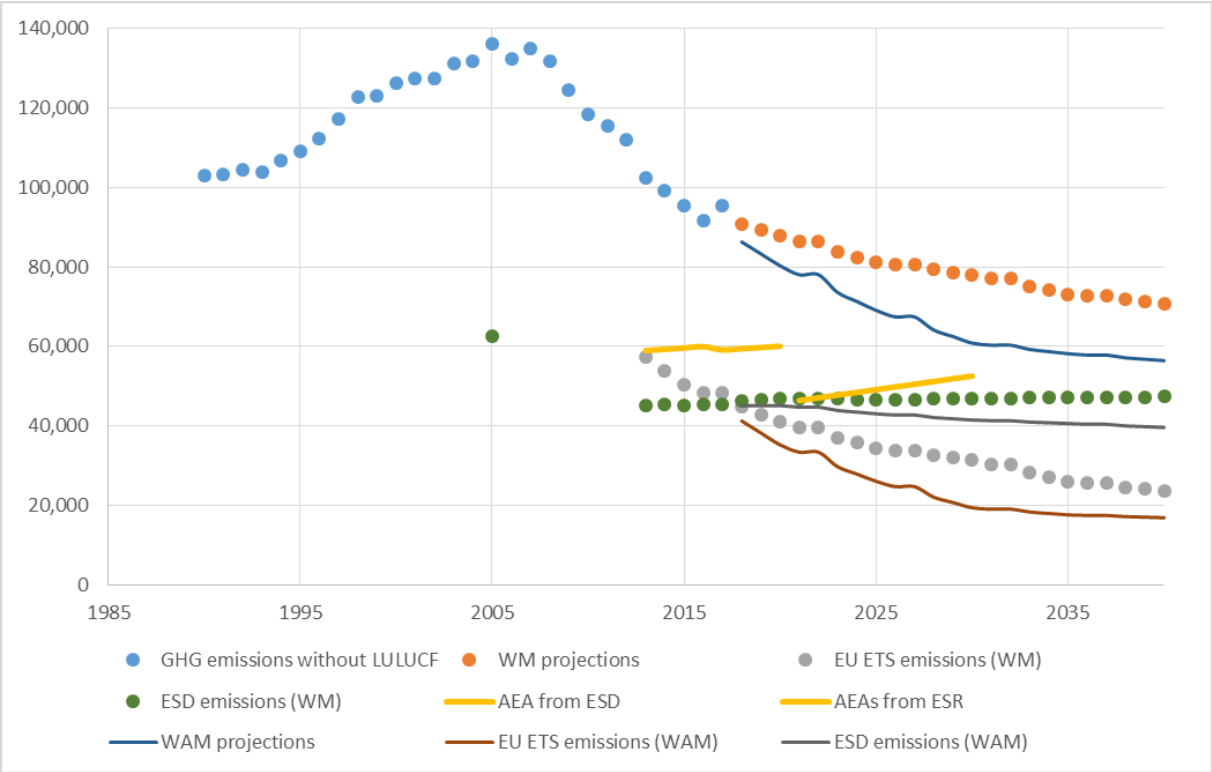


Figure 8. Projections of total national GHG emissions (excluding LULUCF), EU ETS and ESD sectors (in ktCO2eq)

Table 35. Projections of total national GHG emissions (excluding LULUCF), EU ETS and ESD sectors (in ktCO2eq)

year	National emissions excl LULUCF		EU ETS		ESD	
	WM	WAM	WM	WAM	WM	WAM
2015	95,330	95,330	50,236	50,236	45,094	45,094
2020	87,900	80,309	41,008	35,204	46,892	45,105
2025	81,054	69,083	34,399	26,031	46,655	43,052
2030	78,135	60,855	31,289	19,380	46,846	41,475
2035	73,080	58,174	25,950	17,582	47,129	40,592
2040	70,840	56,433	23,543	16,847	47,297	39,586

Concerning the 2020 non-ETS target (ESD target) of Greece pursuant to European legislation (Commission Decision 2013/162/EU as amended by 2017/147/EU and Commission Decision 2013/634/EU), by comparing the annual emissions allocation for the years 2013-2020 (Table 1) with the projected emissions from ESD sectors (Figure 8), it is concluded that it is anticipated that Greece will meet this target, on the basis of the domestic policies and measures.

Concerning the 2030 non-ETS target (ESR target) of Greece pursuant to European Regulation 2018/842, each Member State shall ensure that its greenhouse gas emissions in each year between 2021 and 2029 do not exceed the limit defined by a linear trajectory, starting on the average of its greenhouse gas emissions during 2016, 2017 and 2018 and ending in 2030 on the limit set for that Member State (-16% for Greece). The linear trajectory of a Member State shall start either at five-twelfths of the distance from 2019 to 2020 or in 2020, whichever results in a lower allocation for that Member State. It is projected that Greece will also meet the ESR target on the basis of the domestic policies and measures.

It should be mentioned that the above conclusions are based on the comparison of projections and annual emissions allocation calculated by applying global warming potential values from the fourth IPCC assessment report.

5.2 Assessment of aggregate effects of policies and measures

In this chapter the estimated and expected total effect of implemented/ adopted and planned policies and measures is presented. The planned policies are the additional PaMs in order to meet the targets specified in the recently adopted NECP (S. section 4.1.2.1). The effects of individual policies and measures are reported in the policies and measures section (chapter 4).

The aggregate effect of currently implemented and adopted policies and measures (that is incorporated in the “with measures” projections scenario) is presented in Table 36 in terms of GHG emissions avoided on a CO2 equivalent basis. The effect of policies, or with other words GHG emissions avoided, correspond mainly to CO2, with the exception of policies in industrial processes, waste and agriculture sectors. In the case of waste sector, GHG emissions avoided correspond totally to CH4, while in the agriculture sector about 70% to N2O and 30% to CH4. In the case of industrial processes sector, GHG emissions avoided correspond totally to HFCs and PFCs. The aggregated effect of planned PaMs is presented in Table 37.

Table 36 Aggregate effect of currently implemented and adopted policies and measures (kt CO2 eq)

Policies and Measures	Effect of implemented and adopted policies and measures			
	2015	2020	2025	2030
Energy sector (CO2)	23211	29674	31692	33655
Transport sector (CO2)	501	1228	1302	1394
Industrial processes (HFC, PFC)	NA	460	1400	2300
Agriculture (CH4 30%, N2O 70%)	800	715	1000	1300
Waste Sector (only CH4)	800	1000	1500	2000
Total Effect	**25312**	**33077**	**36894**	**40649**

Table 37 Aggregate effect of planned policies and measures (kt CO2 eq)

Policies and Measures	Effect of implemented and adopted policies and measures	
	2025	2030
Energy sector (CO2)	11357	16058
Transport sector (CO2)	1302	619
Total Effect	**11503**	**16677**

5.3 Supplementarity relating to mechanisms under Article 6, 12 and 17, of the Kyoto Protocol

Within EU, supplementarity obligations under the Kyoto Protocol require that any international credit purchases by Member States must be in addition to emission abatement action taken domestically. The use of flexible mechanisms within the EU takes place by operators in the EU ETS and by governments in their achievement of Kyoto targets.

As it was reported in the 7th National Communication, Greece has fulfilled its Kyoto Protocol target for the 1st commitment period. The target was met on the basis of the domestic policies and measures (including EU-ETS). The installations subject to the EU-ETS were allowed to use JI and CDM credits. According to the principle of supplementarity of the Kyoto Protocol, installations were allowed to use for compliance credits from these two mechanisms up to 9% of their allocated allowances for years 2008-2012. This figure was calculated according to the supplementarity principle.

The use of flexible mechanisms for the 2020 target is described in section 3.2.2 and Table 2. Greece will not use credits from flexible mechanisms for its ESD target. EU-ETS operators could use international credits subject to quantitative and qualitative limits.

5.4 Methodology used for the presented GHG emission projections

For scenario development and projections two main procedures have been used:

- The projections of energy sector are based on the official energy planning (national energy and climate plan) provided by the MEEN (Directorate of Energy Policy and Energy Efficiency). These data were "translated" to GHG emissions based on the spreadsheet models used for the estimation of annual GHG inventory.
- Spreadsheet models for the non-energy sectors, in which future changes in activity data are mainly derived from statistical analysis, while emission factors are derived from expert assessments based on the 2006 IPCC guidelines and country specific information.
- Actual inventory data till year 2017 have been used in the preparation of the emission projections.

Emissions for all sectors were projected using the same models that were used for the NC7 / BR3, updated to:

- include improvements in inventory reporting;
- include emissions for 2017, as reported in the 2019 NIR submission; and
- update of key assumptions, in order to reflect in the projections the current economic situation, and the most recent forecasts of macroeconomic parameters (e.g. GDP, fuel and carbon prices).

5.4.1 Energy Sector

5.4.1.1 Methodology

The energy planning is performed by the MEEN (Directorate of Energy Policy and Energy Efficiency). It is based on the execution of energy planning models, which was performed by the Center for Renewable Energy Sources / Energy Systems Analysis Lab. In order to simulate the Greek energy system and to project its future structure, the Integrated MARKAL-EFOM System (TIMES)[32] in combination with PropSim[33] were used.

The main input data for TIMES are: GDP and population forecasts, import prices of energy commodities, CO2 prices, costs of energy technologies, and potential of indigenous energy sources (conventional and renewable). The main input data for PropSim are chronological curves of customer load and production of non-dispatchable power plants, expansion plan of power system (energy technology capacities, investments on power plants), and electricity demand.

The use of these models leads to the conduction of analytical quantitative targets per technology, such as the demanded power for wind turbines, small - scale hydro or biomass or the quantification of energy savings in the industrial and residential sectors, etc.

The evaluation of policies has been performed using the TIMES energy model. TIMES constitutes a tool that simulates and optimizes the energy market. It is being continuously developed in the context of the Energy Technology Systems Analysis Programme (ETSAP) of the International Energy Agency (IEA), in which Greece participates as a Member State. The TIMES model is driven by the predicted useful energy demand. By determining the evolution of the useful energy demand (i.e. heating, ventilating and air conditioning, lighting), in the input of the model, and combining it with the course of techno-economical parameters of various energy technologies, the model optimizes the energy technology and fuel combination that satisfies the energy demand and the targets set by energy strategies (concerning emissions, energy conservation, etc.).

[32] http://www.iea-etsap.org/web/Times.asp

[33] Probabilistic Production Simulation:

http://www.sciencedirect.com/science/article/pii/S1364032114008247

The basic components in TIMES model are specific types of energy or emission control technology. Each is represented quantitatively by a set of performance and cost characteristics. A menu of both existing and future technologies is input to the model. Both the supply and demand sides are integrated, so that one side responds automatically to changes in the other. The model selects the combination of technologies that minimizes total energy system cost.

Thus, unlike some "bottom-up" technical-economic models, TIMES does not require - or permit - an a priori ranking of greenhouse gas abatement measures as an input to the model. The model chooses the preferred technologies and provides the ranking as a result. Indeed, the choice of abatement measures often depends upon the degree of future abatement that is required.

In order to improve the simulation of the electricity system, the PropSim model has been used. Using PropSim enables the identification of the best possible electricity generation system that satisfies the given energy demand. The model simulates the operation of the generation system derived and calculates the peak load capacity required, the balancing units capacity required to cover the residual load hourly variations and the storage capacity required to restrict energy curtailment.

In addition, the following models have been used:

- WASP IV, which permits the user to find an optimal expansion plan for a power generating system over a long period through discrete investments); and
- HSIMUL (developed by CRES) for the hourly simulation of the electricity market, to estimate the production shares of each unit of the system.

5.4.1.2 Scenario definition

The level of emissions estimated in WM and WAM scenarios depends on assumptions regarding main parameters, such as population, economic growth, energy prices etc. It also depends on the specific policies incorporated into the scenario. The implemented / adopted and the planned policies and measures, which were presented in Chapter 4, are incorporated in the “with measures” and “with additional measures” scenarios, respectively. The main assumptions made for the projection of GHG emissions in WM and WAM scenarios are presented in section 5.4.1.3 and **CTF Table 5**. The projections of energy production and consumption data were converted to GHG emissions by following the 2006 IPCC Guidelines and by applying global warming potential values from the fourth IPCC assessment

report, in line with the national GHG inventory submissions. Emission factors are derived from expert assessments based on the 2006 IPCC guidelines and country specific information.

The “with measures” scenario (WM) encompasses currently implemented and adopted policies and measures. The “with additional measures” scenario (WAM) reflects the mitigation effect of planned policies and measures, in addition to currently implemented and adopted policies and measures. It reflects the additional policies and measures of the recently adopted NECP (see section 4.1.2.1). Both scenarios assume an emission allowance cost and the international fuel prices reported in section 5.4.1.3. The evolution of demand for useful energy in the final consumption sectors (buildings, transport, etc.) is shaped by both the evolution of economic activity per sector and the evolution of population, housing, household size, production capacity of individual industrial sectors and other macroeconomic and demographic parameters.

The base year for energy projections is 2017, as it was the most recent year for which a GHG inventory was available by the time of compilation of the draft integrated national energy and climate plan submitted.

The following national targets will be achieved by the WM and WAM scenarios as concerns 2020:

- Non ETS sectors reduction target -4% (from 2005 level).
- Simulation of ETS operation assuming a cost of CO2 emissions for ETS industries indicated in section 5.4.1.3.
- 18% RES target (Gross final consumption pursuant the Renewable Energy Directive)
- Energy Efficiency targets according to Directive 2006/32/EC (national final energy savings 9% by 2016). Additionally, the energy conservation will evolve according to European target of 20%, as it is defined in Directive 2012/27/EU (final energy consumption in 2020 will be 18.4 Mtoe).

Concerning 2030, the following national targets are anticipated to be achieved by WAM scenarios (NECP targets):

- Overachievement of the non ETS sectors reduction target -16% (from 2005 level).
- Simulation of ETS operation assuming a cost of CO2 emissions for ETS industries indicated in section 5.4.1.3.
- RES share in gross final energy consumption of at least 35%. Exceed 60% RES share
- Ceasing lignite's share in power generation until 2028 (de-lignification).

- Energy efficiency improvement of at least 38%. Final energy consumption 16.1-16.5 Mtoe. Achieve cumulative energy savings of a 7.3 Mtoe over the period 2021-2030. Additional targets:
- By 2029, interconnect the energy systems of all islands to the mainland, and where this is not possible or in the case of islands that will be connected to the mainland at a later date, install innovative hybrid systems for energy production by RES.
- 19% share of renewables by 2030 in final consumption in the transport sector – share of advanced biofuels used in the transport sector to be 3.5% by 2030 (based on EU methodology);
- By 2030, raise the share of electric passenger cars up to 30% of new registrations;
- Energy renovations for a 3%, on a yearly basis, of the total surface area of the thermal loads of central administration public buildings by 2030;
- By 2030, reach to a 12-15% energy renovation of buildings / building units of the residential building stock

Table 38 compares some energy indices of the two scenarios, namely WM and WAM.

Table 38 Energy indices in 2030

Energy indexes	WM	WAM (NECP)
Share of RES in Gross final energy consumption	25%	35%
Share of RES in Gross consumption of electricity	48%	61%
Share of RES in final consumption for heating and cooling	29%	42.5%
Share of RES in final consumption in transport sector	10%	19%
Final energy consumption	18.2 Mtoe	16.5 Mtoe
Final electricity consumption	53.4 TWh	57.2 TWh
Total RES-E installed capacity	15.3 GW	19.03 GW

Regarding the evolution of RES share in final consumption, they are presented in *Table 19*, *Table 20*, *Table 21* and *Table 22* according to the WAM scenario (NECP). In particular, while the share of RES in electricity generation and heating is relatively linear, the contribution of RES to transport is projected to be more pronounced after 2025, especially towards the end of the next decade and the period 2028-2030, whereby, in economic terms, the optimal penetration of electric vehicles is projected, where renewable

fuels will have the most dominant share in the electricity mix compared to all other fuels, as well as the use of advanced biofuels.

In the field of RES electricity, the leading applications for the next period that will contribute to the achievement of the targets are wind farms and photovoltaic parks, which are considered to be the most mature and competitive ones in market and economic terms.

Regarding the evolution of RES to meet thermal needs in final consumption, a significant increase in the role of heat pumps is anticipated, especially in the tertiary sector. Moreover, an increased participation of thermal solar systems and geothermal energy as well as a steady contribution of biomass is expected.

The estimation of the GHG emissions is based on the formation of analytical energy balances for the years 2020, 2025, 2030, 2035 and 2040 and the computation of emissions per fuel and technology in every sector. Table 39 and Table 40 include the projections of emissions from the energy sector under WM and WAM (NECP) scenarios, respectively.

Table 39 GHG emissions from the energy sector (in ktCO2eq) for 'with measures' scenario of projections

Sector / Year	2020	2025	2030	2035	2040
Energy Industries	32,184	25,861	22,788	17,317	14,936
Fugitives emissions	725	545	491	311	275
Man. Industry and Construction	5,588	5,564	5,704	5,949	6,014
Transport	17,731	17,918	17,444	16,978	16,697
Tertiary	1,075	1,084	1,107	1,158	1,293
Residential	5,961	5,873	5,914	6,135	6,128
Agriculture	869	852	858	840	837
Other	253	253	253	253	253
TOTAL	**64,385**	**57,950**	**54,560**	**48,940**	**46,435**

Table 40 GHG emissions from the energy sector (in ktCO2eq) for 'with additional measures' scenario of projections

Sector / Year	2020	2025	2030	2035	2040
Energy Industries	26,499	17,477	10,942	9,087	8,848
Fugitives emissions	505	287	123	108	104
Man. Industry and Construction	5,159	4,800	4,428	4,292	3,861
Transport	17,806	17,869	16,866	15,814	14,941
Tertiary	842	905	824	782	733
Residential	5,098	3,781	3,209	3,118	2,755
Agriculture	631	620	614	577	538
Other	253	253	253	253	253
TOTAL	**56,793**	**45,993**	**37,259**	**34,032**	**32,032**

5.4.1.3 Main assumptions

The level of emissions estimated in any scenario depends on assumptions regarding main parameters, such as population, economic growth, energy prices etc. It also depends on the specific policies incorporated into the scenario. Implemented and adopted policies and measures, which were presented in chapter 4, are incorporated in the "with measures" scenario, while planned policies and measures are incorporated in "with additional measures" scenario. The main assumptions made for the projection of GHG emissions, which are the same for both WM and WAM scenarios and were also reported in the **CTF Table 5**, are analyzed as follows:

International fuel prices: they are presented in Table below (source: NECP).

Table 41 International fuel prices according to IEA

Fuel	2020	2025	2030	2035	2040
Crude oil [€ 2016/GJ]	11.90	15.73	17.33	18.08	19.14
Natural Gas [€ 2016/GJ]	6.80	7.71	8.12	10.08	10.42
Coal [€ 2016/GJ]	2.85	3.16	3.79	4.01	4.18

Price of CO2 emission allowances (EUAs): the EUA's price during the period 2020-2040 is presented in Table 42 (source: NECP).

Table 42 CO2 emission allowances price

	2020	2025	2030	2035	2040
CO2 emission allowances € 2016 /tCO2	24.00	28.77	31.23	43.50	51.70

Demographic characteristics: the population during the period 2020-2040 is presented in Table 43 (source: NECP).

Table 43 Population evolution 2020-2040

Year	2020	2025	2030	2035	2040
Population [bil]	10.69	10.54	10.37	10.20	10.03

Macroeconomic data: Energy demand development of the system depends to a great extent on the development of relevant economic activity sectors, the effect of current economic recession and the way that they are diffused in the population and the impacts in its living standards. In Table 44 the projected macroeconomic data till 2040 are presented. The projections of main macroeconomic indexes were provided by the Ministry of Finance.

Table 44 Gross domestic product growth (Average Annual)

	2020	2025	2030	2035	2040
GDP (bil Euro 2016)	200.08	221.66	244.73	270.21	295.42

5.4.2 Non-energy sectors

5.4.2.1 Methodology

GHG emissions in the non-energy sectors are calculated using spreadsheet models that calculate emissions based on activity data, emission factors and sector specific assumptions, according to the following general equation:

$$E_{g,t} = \sum_{j=1}^{J} A_{0,j} \cdot (1 + r(x_i))^t \cdot C_{g,j}$$

where,

j : An activity, which constitutes a source of GHG emissions (source)

Eg,t : Projection of emissions of g-greenhouse gas in year-t

A0,j : Activity data of the j-source of emissions in base year

r(xi) : Growth rate of activity data for j-source based on the changes of the determinant parameter x

Cg,j : Emission factor of the g-greenhouse gas for the j-source consistent to the latest GHG inventory submission and 2006 IPCC Guidelines.

The growth factor accounts for changes (increases or decreases) in the emission-generating activity. In estimating the growth factor, time-series analysis and/or regression analysis using appropriate determinant parameters of the available activity data is used. Potential determinant parameters include population, value added, product output, etc.

5.4.2.2 Industrial processes and product use sector

Projected emissions from industrial processes and product use sector are based mainly on the analysis (a) of the activity data of the respective industrial branches and (b) the apparent consumption of refrigeration and air-conditioning appliances. The emission factors used are similar to those reported in the latest inventory, according to 2006 IPCC guidelines and country specific data.

The main assumptions that were adopted in the context of the present analysis in order to evaluate the future development of GHG emissions from the industrial processes sector are presented in Table 45. The economic recession of our times is taken into consideration. In order to ensure consistency with energy sector's projections, the emissions from the sectors: mineral products, metal production and chemical industry, were projected on the basis of the emission projections of the energy sector, as it is indicated in Table 45. Projected emissions under both scenarios (WM and WAM) are practically identical.

Table 45 Main assumptions for the "with measures" scenario in IPPU sector.

Process	Projections
Mineral products (Mt)	The energy projected to be consumed by Times model was used as a driver for the estimation of process emissions.
Metal production (Mt)	The energy projected to be consumed in metal production plants by Times model was used as a driver for the estimation of process emissions.
Chemical industry	One Nitric acid production unit will be in operation from 2007 and afterwards. The energy projected to be consumed in ammonia production plants by Times model was used as a driver for the estimation of emissions of ammonia production
Production of F-gases	HCFC-22 production has been stopped since 2006.
Consumption of F-gases	The mitigation effect of EU Regulation 517/2014 was reflected in the projections.

The projections of GHG from IPPU sector show a decrease compared to 1990 levels (Table 46). Key highlights include:

- ✓ HFCs emissions from HCFC-22 manufacture does not occur since 2006, because the HCFC-22 production unit ceased operation.

- ✓ HFCs emissions due to the use of refrigeration and air-conditioning equipment decrease with a rate of about 3.2% per annum for the period 2015 – 2020. This decrease is attributed to the implementation of the new EU Regulation of the European Parliament and of the Council of 16 April 2014 (No 517/2014) on fluorinated greenhouse gases. In specific, the reduction in the emissions is expected due to the prevention of leakages and emissions (emission prevention and leak checks, end of life treatment of products and equipment, training and qualification, information for users (labelling, product infos) and the control of use of F-gases (ban on new applications, ban on uses, phase-down of HFC supply). Directive 2006/40 of the European Parliament and of the Council of 17 May 2006 relating to emissions from air-conditioning systems in motor vehicles amending Council 70/156/EEC is also anticipating reducing F-gases emissions from MACs.

Table 46. Projections of GHG emissions from the IPPU sector (in kt CO_2eq)

Year	2015	2020	2025	2030	2035	2040
Mineral products	3,909	3,746	3,725	3,787	3,793	3,909
Chemical industry	515.52	288.98	288.28	288.34	288.72	286.53
Metal production	1,210	1,211	1,167	1,134	1,117	1,077
Other product manufacture and use	260.64	271.94	291.19	308.33	325.23	348.61
Product uses as substitutes for ODS	6,053	4,997	4,449	4,556	4,600	4,550
Total	11,996	10,678	9,941	10,012	10,118	10,055

5.4.2.3 Waste sector

Solid waste disposal on land is the major source of GHG emissions from the waste sector. For the projection of emissions from solid waste, the generation rate of quantities of solid waste was considered as shown in Table 47, based on the analysis of the trends observed in the previous decade and data provided by Ministry of Environment and Energy.

In order to estimate the composition of MSW generated on an annual basis, the assumptions presented in the last National Inventory Report (2019) were used. It was assumed that the share of putrescibles decreases by 0.3% annually, the share of metals and glass decreases annually by 0.1% and 0.02% respectively, the share of paper and plastics increases by 0.2% annually and the share of wood and textiles remains constant 1% and 3.25%, respectively.

Finally, the quantities of the solid waste end out at disposal sites were estimated on the bases of historical data as well as on the implementation of implemented/adopted policies and measures. The composition of the solid waste landfilled at disposal sites was estimated taking into account the composition of MSW generated and the amounts of waste recycling and compost. The Municipal solid waste generation, the Municipal solid waste going to landfills and the share of CH4 recovery in total CH4 generation from landfills are presented in Table 47**.**

Table 47. Main assumptions of projections scenarios for solid waste disposal on land

	2015	2016	2020	2025	2030	2035	2040
Municipal solid waste (MSW) generation (kt)	3800	3862	4150	4449	4783	4904	5027
Municipal solid waste (MSW) going to landfills (kt)	3012	2974	1085	984	920	490	503
Share of CH_4 recovery in total CH_4 generation from landfills (%)	31.7	32.5	32.0	33.3	34.3	34.4	34.2

Policy issues that affect significantly the projection of GHG emissions from solid waste disposal on land and wastewater handling include (a) the implementation of Council Directive 1999/31, regarding sanitary landfill (which is the main reason for the significant increase of waste recycled, especially from 2010 and onwards and the increase on the implementation of systems for flaring or recovery of biogas), (b) the Directive (EU) 2018/850 for the amendment of Directive 1999/31 / EC on the landfill of waste and (c) the Directive on Packaging and Packaging Waste (94/62/EC) concerning the Paper and Cardboard recycling, as amended by Directive (EU) 2018/852.

The estimation of methane emissions from solid waste disposal on land was performed with the FOD method while the default 2006 IPCC methodology was followed for the other source categories (domestic

wastewater handling, human sewage and industrial wastewater handling). The total emissions from waste sector are presented in Table 48.

Table 48. GHG emissions from the waste sector (kt CO_2eq)

Year	2015	2016	2020	2025	2030	2035	2040
Solid Waste Disposal on Land	3149	3142	3063	2763	2516	2252	2015
Wastewater	1285	1335	1385	1466	1553	1651	1739
Waste Incineration	5.9	4.7	4.5	5.0	5.4	6.0	6.4
Compost	23.2	31.2	323.5	334.8	346.0	380.1	389.7
Total	**4463**	**4513**	**4776**	**4569**	**4421**	**4289**	**4150**

5.4.2.4 Agriculture

The main determinant parameters of GHG emissions from agriculture are the animal population, the quantities of synthetic nitrogen fertilizers applied on soils and the agricultural crops production.

Regarding the animal population, the rate of change of population of each animal category is estimated based on the analysis of the expected GDP evolution for the next decades.

The use of synthetic nitrogen fertilizers (Table 49) increases continuously with a mean annual rate of 0.5% for the period 2000 – 2030. The decrease in the use of synthetic nitrogen fertilizers for the period 2010-2020 could probably be attributed to the mitigation measures and to the effect of the economic crisis, while for the period 2020-2040 an increase in the use of synthetic nitrogen fertilizer is foreseen as the result of the anticipated economic recovery despite the impact of the mitigation measures. Data for the period 1990-2015 derive from the Pan-Hellenic Association of Professional Fertilizers Producers & Dealers (PHAPFPD), while the projections are based on the analysis of the trends observed in the whole period 1990-2017.

Table 49. Animal population (thousands) per species (3-year average)

	Historical		Projection			
Animal population (thousands)	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Dairy cattle	111	101	108	116	124	131
Non dairy cattle	471	474	509	545	583	614
Buffalos	4	5	5	5	6	6
Sheep	8746	8989	9651	10328	11053	11643
Goats	4127	4094	4396	4704	5034	5303
Horses	21	16	17	18	19	20
Asses & mules	16	9	9	10	11	11
Swine	714	719	771	826	884	931
Poultry	32111	37078	39809	42603	45594	48028

Table 50. Projection of nitrogen inputs in soils (in kt) from synthetic fertilizers

	Historical	Projection				
	2015	**2020**	**2025**	**2030**	**2035**	**2040**
Synthetic fertilizers (kt N)	164	182	186	191	196	199

Finally for the projection of agricultural crops production, similarly with the animal population, an analysis based on the expected GDP evolution for the next decades, was performed. In Table 51, the projections of agricultural crops production areas for the period examined are presented.

For the estimation of CH4 emissions from enteric fermentation of cattle and sheep, which account for 80% of methane from this sub-source, Tier 2 methodologies were applied, while for the other animal default emission factors by 2006 IPCC Guidelines for Eastern Europe are used. The CH4 emissions from manure management are estimated based on emissions factors suggested by 2006 PCC Guidelines for developed countries. The emission factors used for the estimation of N2O from manure management are the ones suggested by IPCC Guidelines for Western Europe for cattle and buffalo and for Mediterranean countries for the rest of the animals. The methodologies and emission factors suggested by the 2006 IPCC

Guidelines were used for the estimation of GHG emissions from agricultural soils, rice cultivations and field burning of agricultural residues. Finally, other parameters like manure management systems and percentage of agricultural residues burned on site are kept constant at 2000 levels, while it is also assumed that climate parameters will not undergo significant changes.

Table 51. Projection of agricultural crops production

	Historical		Projection				
Production (ktn)	**2015**	**2016**	**2020**	**2025**	**2030**	**2035**	**2040**
Wheat	1459	1561	1696	1821	1949	2086	2197
Barley	413	382	376	404	432	463	487
Oats	107	103	105	112	120	129	136
Rye	33	29	29	31	33	36	38
Maize	1716	1505	1528	1640	1755	1878	1979
Rice	264	277	293	315	337	360	379
Beans	21	17	17	19	20	21	22
Peas	0.4	0.6	0.6	0.6	0.7	0.7	0.8
Potatoes	581	495	493	529	567	606	639
Sugarbeet	353	314	312	335	359	384	405

Total GHG emissions from agriculture are presented in Table 52.

Table 52. GHG emissions from agriculture in the "with measures" scenario (kt CO_2eq)

	Historical		Projection				
Year	**2015**	**2016**	**2020**	**2025**	**2030**	**2035**	**2040**
Enteric Fermentation	3730	3643	3756	4033	4316	4619	4866
Manure Management	935	922	947	1017	1088	1165	1227

Rice Cultivation	145	161	170	182	195	209	220
Agricultural Soils	2974	3066	3113	3282	3457	3648	3791
Field Burning of Agricultural Residues	39	38	39	42	45	48	51
Urea application	23	26	35	38	41	43	46
Total	**7846**	**7856**	**8061**	**8595**	**9142**	**9732**	**10201**

In general, emissions from the agriculture sector for the period 2015-2020 remain constant in contrast to anticipated increase trend of GDP. Except of the citified way of life which has been adopted and the abandonment of rural areas, this trend could be attributed to reduction of agricultural production and to the reduction in the use of synthetic nitrogen fertilizers.

For the rest period, an increase in emissions from the agriculture sector is foreseen as a consequence of anticipated economic recovery. It must be mentioned that the mitigation measures for this period have also been taken into consideration resulting in a slight increase of GHGs emissions compared to what would be in their absence.

5.4.2.5 LULUCF sector

The projections for years 2020, 2025, 2030 and 2035 for the LULUCF sector in Greece are presented in Table 53 below.

Table 53 Projections in LULUCF sector

	GHG emission projections					
	(kt CO2 eq.)					
	2015	2016	2020	2025	2030	2035
Forestry/LULUCF	-3692	-3309	-1634	-1056	-645	-195
	Gas					
	(kt)					
CO_2	-3718	-3357	-1705	-1127	-715	-266

CH_4	0.43	1.27	2.20	2.20	2.20	2.20
N_2O	0.05208	0.05692	0.05135	0.05135	0.05135	0.05135

The projections estimations were based on methods and assumptions used for the estimation of emissions and removals during 1990 – 2016. Emission factors applied are the ones used in the preparation of the last submitted inventory. An analysis of data and trends of the last decades was elaborated in order to estimate the evolution of GHG emissions and removals, and the following assumptions have been made:

- According to the forest definition used in the inventory, the area of managed and harvested forest land will remain constant, equal to 2016 levels.
- The annual biomass uptake in these lands, as well as the annual losses as a result of the fellings, follow the trend observed from 2000 onwards.
- The contribution of harvested wood products pool in total net emissions/removals follows the trend observed from 2000 onwards.
- Area under deforestation activities will remain constant and equal to the average area deforested during the period 1990 – 2016.
- Carbon stock changes in areas under conversion to forest land will remain constant and equal to the average estimated during the period 2000 – 2016.
- Areas affected by wildfires each year will be equal to the average area burnt in the period 1990 – 2016 (this assumption results in reduced inter-annual variation in net emissions/ removals of greenhouse gases from this sector in relation to the variation observed during 1990 – 2016).
- N2O emissions arising from N mineralization associated with loss of soil organic matter resulting from change of land use or management of mineral soils will remain constant and equal to the average during the period 1990 – 2016.

As depicted in Table 53 the sink capacity of the LULUCF sector is projected to decrease significantly in the future, from -3.31 Mt CO2 eq in 2016 to -0.19 Mt CO2 eq. in 2035.

In LULUCF sector CO2 is the main greenhouse gas emitted to and removed from the atmosphere following carbon stocks changes in different carbon pools. Non-CO2 greenhouse gases (CH4 and N2O) and indirect GHG are released in relatively small quantities mainly when biomass is burnt.

During the period 1990–2016 forest land category acts as net carbon sink. Emissions/removals from forest land are the result of the balance mainly in biomass increment from forest growth and biomass loss due to fellings and wildfires. Net removals from forest land show an upward trend in the inventory period

that is attributed mainly to the reduction in fellings and the afforestation programmes started in 1994. The upward trend is projected to continue until 2035, with a lower rate however. The share of the forest land category to the total emissions/removals of the sector is projected to fluctuate between 55% and 70% approximately during the period 2020-2035.

Wildfires constitute a common disturbance in Mediterranean basin and in Greece in particular. Their occurrence is difficult to predict, consequently any projection for emissions as a result of the wildfires involves higher uncertainties. For this reason, the average of emissions during the period 1990–2016 was used for the projection of emissions from wildfires. CO2 and non-CO2 emissions are projected to represent approximately 1% of the total emissions/removals.

With regard to emissions resulting from the conversion of forest land (deforestation) those are expected to remain at low levels. Greek law allows the land-use change of forest land only in cases of national interest and thus there is only a very small area where such land-use conversions occur (e.g. construction of high-tension lines). The share of emissions from forest land conversions is projected to be at approximately 1% of the total emissions/removals of the sector.

Given that no county specific policies and information about future harvested wood products (HWP) from domestic forests are available, projections of emissions/removals from this pool are based on the trend observed from 2000 onwards. HWP pool is projected to represent a source of emissions during the period 2020-2035, with its share to be estimated at approximately 5-15% of total emissions/removals from the LULUCF sector.

During the period 1990-2016 removals from cropland, fluctuate between 0.1-1.0 Mt CO2 eq yr-1 (except 2007, 2013, 2014 where the category acts as a source). Following the trend observed during the inventory period, cropland category is projected to represent a source of emissions in the period 2020-2035, as a result of the eradication and establishment of new of perennial woody crops (change to a different crop type). The share of emissions/removals from cropland to the total emissions/removals is expected to be between 15-35% during the period 2020-2035.

Grassland category is projected to act as a sink in the period 2020-2035 mainly due to conversion of cropland to grassland. Emissions from that category are primarily the result of conversion of forest land to grassland and changes in vegetation type, as well as, the result of wildfires. The share of emissions/removals from grassland category is projected to be at approximately 10% of the total

emissions/removals, with the share of wildfires emissions in grassland areas to represent less than 0.5-1% of the total emissions/removals.

5.4.3 Results of the sensitivity analysis performed for the projections

During the preparation of projections, many alternative scenarios based on sensitivity analysis of their input variables and underlying assumptions were examined.

In this chapter, the sensitivity analysis that was presented in the previous submission, is enriched with two additional scenarios of GHG emissions projections, namely the current WM and WAM scenarios. In the next table, the 5 scenarios are presented.

Apart for the energy sector, no other sector is included in sensitivity analysis, since the energy sector accounts for around 80% of GHG emissions.

Table 54. Main assumptions of Sensitivity Analysis Scenarios

Scenario No	Main assumptions
SensSc1	WM scenario 2017
SensSc2	The annual rate of change in final energy demand of all sectors (Residential, Tertiary, Transport and Industry) is 30% lower compared to WM levels
SensSc3	The annual rate of change in final energy demand in Industry is 30% lower and in the Tertiary sector is 30% higher compared to WM levels
SensSc4	WM scenario 2019
SensSc5	WAM scenario (NECP)

In Figure 9, the evolution of GHG emission projections of the scenarios listed in Table 54 is illustrated. As it can be observed from the figure, the current WM and WAM scenarios correspond to lower emission levels compared to the scenarios reported in the previous submission. For example, for the year 2030, the emissions under WM-2019 and WAM (NECP) are 9% and 29% lower compared to WM-2017. This is attributed to the deviation of the main assumptions between the scenarios, e.g. the CO2 emission allowances considered under WM-2019 and WAM-2019 are 70-95% higher compared to WM-2017; and to the fact that the WM and WAM (NECP) scenarios reflect new targets that were adopted under the

framework of the integrated national energy and climate plan pursuant to Regulation (EU) 2018/1999, e.g. the target of Greece of renewable energy sources in gross final energy consumption for 2030 was set to 35%, while in WM-2017 was 25%.

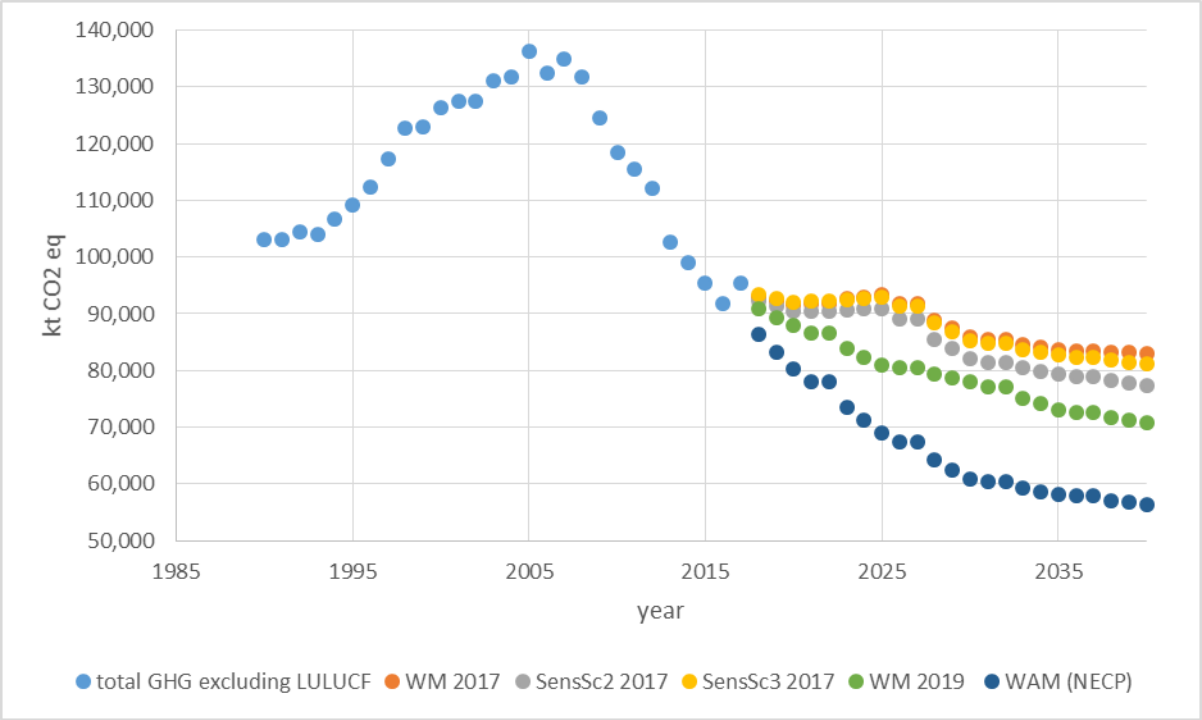


Figure 9. Evolution of GHG emission projections corresponding to the sensitivity analysis scenarios examined

5.5 Projections of indirect GHGs

In Table 55, the emission projections of the air-pollutants NOx, SOx, NMVOC, PM2.5 and NH3 are presented. These projections have to be reported every two years based on fuel sold under the UNECE LRTAP Convention as well as under the NEC Directive 2016/2284/EU. They are based on the NECP scenario of the projections of GHG emissions.

Table 55 Emission projections for years 2020 till 2040

Pollutant	2019 Emission Inventory		Projections			
(kt)	2005	2015	2020	2025	2030	2040
NOx	462.03	247.87	203.52	182.74	155.58	154.59
NMVOC	308.04	146.76	125.75	115.82	106.06	92.42
SOx	549.35	83.64	50.54	38.11	26.39	24.19
NH3	75.74	65.60	65.13	63.40	67.02	68.20
PM2.5	47.65	27.47	24.44	22.70	21.73	21.91

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

6.1 Introduction

This chapter contains information on the provision of financial, technological and capacity building support to non-Annex I Parties.

Greece is committed, as both a UN and an EU Member State, to the global partnership to eradicate extreme poverty and contributes financially to the achievement of the Millennium Development Goals (MDGs). Moreover, Greece has actively participated in the preparations for the "Rio+20" UN Conference on Sustainable Development (June 2012, Rio de Janeiro) as well as its follow up, at EU and UN levels, with a view to the formulation, inter alia, of a single and coherent post-2015 development framework that while continuing giving emphasis on poverty eradication, it will focus on sustainable development for all countries irrespectively of their development status as well as to the adoption of Sustainable Development Goals (SDGs) for the period 2015-2030 and a view towards 2050.

Through its bilateral and multilateral development cooperation, Greece provides financial resources to support national development initiatives and to address global developmental issues in the fields of sustainable development, health, environment, etc. A part of Greece's ODA is channeled directly to institutions and/or policies aiming to address environmental issues at the global or regional level, while environmental sustainability is a cross-cutting objective of the programmes, projects and policies financed.

Overall responsibility for development cooperation lies with the Ministry of Foreign Affairs, where the General Directorate for International Development Cooperation (Hellenic Aid /"YDAS") has systems in place to track, measure and record climate change related assistance provided to developing countries. Specifically, the Hellenic Aid programme coordinates programming, allocation and monitoring of development cooperation, multilateral and bilateral funding. The Ministry of Economy is responsible for Greece's contributions to multilateral institutions, such as the Global Environmental Facility, the World Bank, the European Bank for Reconstruction and Development and the United Nations Development Programme. The Ministry of Environment and Energy is responsible for the allocation of annual official and multilateral contributions to international organizations, United Nations convention secretariats including the

United Nations Environment Programme and the UNFCCC, trust funds and agencies related to environmental issues.

In order to facilitate and finance the transfer of, access to and deployment of climate-friendly technologies for the benefit of non-Annex I Parties; to support the development and enhancement of endogenous capacities and technologies of non-Annex I Parties; and promote and scale up private investment in mitigation and adaptation activities in developing countries, by National Law 4369/2016 (article 50) has been legislated that part of the funds from auctions of undistributed emission allowances from the EU ETS may be allocated to assistance for developing countries to reduce their GHG emissions and to adapt to climate change. At the moment, there are no other national measures in place to facilitate the above mentioned objectives.

6.2 Methodology for tracking the provision of finance, technology and capacity building support

Financial, technological and capacity-building support reported in this National Communication / Biennial Report are considered to be "new and additional resources", meaning that they were committed after and not included in the previous National Communication or Biennial Report. Greek budget is determined on an annual basis, so that each annual commitment cycle represents new and additional resources. In addition to the definitions listed below, support is considered to target climate-specific activities if:

- ✓ it is provided bilaterally by Greece and is related to mitigation and / or adaptation to climate change;
- ✓ it is provided to a climate change organization, which is a regional, national, or international environmental and scientific organization addressing and /or researching climate change−global warming−sustainability.

Definition of climate finance: Climate finance aims at reducing emissions, and enhancing sinks of greenhouse gases and aims at reducing the vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts (adapted from the UNFCCC Standing Committee on Finance's definition of climate finance).

Definition of mitigation activities: An activity should be considered as climate change mitigation related if it contributes to the objective of stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system by

promoting efforts to reduce or limit GHG emissions or to enhance GHG sequestration (adapted from the operational definition and criteria for eligibility used in the OECD-DAC Policy Markers).

Definition of adaptation activities: An activity should be considered as adaptation related if it intends to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience. This encompasses a range of activities from information and knowledge generation, to capacity development, planning and the implementation of climate change adaptation actions (adapted from the operational definition and criteria for eligibility used in the OECD-DAC Policy Markers).

Definition of climate relevant technology development and transfer: a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions. The broad and inclusive term "transfer" comprises the process of learning to understand, utilize and replicate the technology, including the capacity to choose and adapt to local conditions and integrate it with indigenous technologies (adapted from the IPCC definition of climate relevant technology transfer).

Definition of climate relevant capacity building: capacity-building is a process which seeks to build, develop, strengthen, enhance and improve existing scientific and technical skills, capabilities and institutions particularly in developing countries, to enable them to assess, adapt, manage and develop technologies. Capacity building must be country-driven, addressing specific needs and conditions of developing countries and reflecting their national sustainable development strategies, priorities and initiatives (adapted from the UNFCCC definition of capacity building activities).

Greece uses the OECD Development Assistance Committee (DAC) Rio markers to categorise the purpose of the assistance. For example, among others, funds are classified and tracked per channel of delivery; type of flow; type of finance; geographical region; recipient countries; type of aid; sector of aid; and SDG targets.

The Rio markers are policy indicators and were not originally intended to accurately quantify climate finance. Therefore, an activity can have more than one principal or significant policy objective (i.e. it can be marked for several Rio markers; mitigation, adaptation and other Rio conventions such as Biodiversity and Desertification). Further information on the Rio markers available here: http://www.oecd.org/dac/stats/48785310.pdf.

For the reporting of information, Greece has used the following approach to "translate" the Rio markers data into estimated climate finance flows:

- If an activity is marked as principal for mitigation or adaptation, 100% of the support is considered and reported as climate finance;
- If an aid activity is marked as significant for mitigation or adaptation, then only a part of the support is considered and reported as climate finance. The shares of imputed multilateral contributions provided in the OECD webpage are used in this case.
- To avoid double counting, any activity can only count as 100%, 40% or 0%. If an activity is marked for both mitigation and adaptation, only the highest marking will count when calculating the total climate relevant financial contributing of the activity.

For the share of imputed multilateral contribution 2016-2017 weighted average, please visit OECD webpage: http://www.oecd.org/dac/financing-sustainable-development/development-finance-data/Imputed%20multilateral%20shares.xlsx

For tracking the support to non-Annex I countries various approaches are being used. In 2017 the Ministry of Foreign Affairs carried out, through Hellenic Aid, a comprehensive and thorough evaluation as regards the outcome of projects and programmes funded by Greece in the framework of Memorandums of Understanding or other Agreements that had been signed with international associations and other partners in the previous years. The delivery of the projects' products was reported through status implementation reports, annual reports and/or audit reports by the recipient countries/institutions. The allocation channels that have been used so far include: the Carribean Community Climate Change Centre, the UNDP, the African Union, the World Meteorological Organization, the Indian Ocean Commission, the United States Agency for International Development (USAID) and UNEP. Currently there is no information on indicators used for the tracking of the provision of support by Greece to non-Annex I countries.

Under each Presidency of the Council of the EU (which lasts for six months, either from January until June or from July until December), Greece participates in a formal meeting of the Council of the EU, consisting of Ministers in charge of international development cooperation (Foreign Affairs Council/Development), as well as in an informal meeting of the EU Directors-General of Development Cooperation. In addition, it attends OECD/DAC High- and Senior-level meetings. Hellenic Aid has an active participation in the meetings of the Working Parties of the Council of the EU, including the Working Party on Development Co-operation (CODEV WP) and on the EU's relations with Africa, Caribbean and the Pacific (ACP WP). In 2017, Greece has provided, inter alia, its input as regards the new European Consensus on Development, as well as the new

conventional framework that will govern ACP-EU relations following the expiry of the Cotonou Partnership Agreement (CPA) in 2020.

Currently, Greece does not have a system to track private financial flows, as Greece's current emphasis is on tracking public financial flows associated with climate change.

6.3 Finance

The provision of financial support by Greece to non-Annex I Parties is presented in the following paragraphs and ***CTF Tables 7, 7(a) and 7(b)***.

6.3.1 ODA general trends

While the international crisis was raging, Greece continued in 2017 and up to the summer of 2018 to have its economy supported by a mechanism backed by the European Commission (EC), the European Central Bank (ECB) and the International Monetary Fund (IMF), in order to combat the fundamental causes of its fiscal imbalances and structural weaknesses and ensure viability of public finances and improvement of its international competitiveness.

Despite these developments, Greece will continue to strive, according to its capabilities, for the implementation of the Millennium Development Goals (MDGs), that compose a policy framework for economic stability and prosperity, mainly via intensifying efforts to achieve the quality objectives of development assistance for which Greece has been committed internationally by the "Monterrey Consensus on Financing for Development" (2002), the "Paris Declaration on Aid Effectiveness" (2005), the "European Consensus on Development" (2005), the "Accra Agenda for Action" (2008) and the "Busan Partnership for Effective Development Co-operation" (2011).

Due to the difficult fiscal circumstances that Greece faces net bilateral and multilateral Official Development Assistance (ODA) disbursements have indicated decreasing trends since 2008 both in absolute terms and as a percentage of GNI (cf Table 56 ODA Volumes 2008-2018).

Table 56 ODA Volumes 2008-2018

Year	Bilateral ODA (MUSD)	Bilateral ODA (%GNI)	Multilateral ODA (MUSD)	Multilateral ODA (%GNI)	Total ODA (MUSD)	Total ODA (%GNI)
2008	312	0.09	391	0.12	703	**0.21**

2009	297	0.09	310	0.10	607	**0.19**
2010	212	0.07	296	0.10	508	**0.17**
2011	154	0.05	271	0.10	425	**0.15**
2012	107	0.04	220	0.09	327	**0.13**
2013	43.61	0.02	195.45	0.08	239.07	**0.10**
2014	46.10	0.02	201.34	0.09	247.44	**0.11**
2015	71.88	0.04	166.82	0.08	238.70	**0.12**
2016	159.15	0.08	209.38	0.11	368.53	**0.19**
2017	85	0.04	229	0.12	314	**0.16**
2018	38.64	0.02	251.8	0.12	290.44	**0.13**

Source:

Years 2008-2017: Data retrieved by the "ANNUAL REPORT OF THE GREEK BILATERAL AND MULTILATERAL OFFICIAL DEVELOPMENT CO-OPERATION AND ASSISTANCE", MINISTRY OF FOREIGN AFFAIRS, DIRECTORATE GENERAL FOR INTERNATIONAL DEVELOPMENT CO-OPERATION (Y.D.A.S), November 2009 - January 2019

Year 2018: OECD Statistics, preliminary data (accessed on the 27th of January 2019)

Total (bilateral and multilateral) ODA granted by Greece in 2018 reached 290.44 MUSD, that is 0.13% of GNI . Multilateral ODA reached about 251.80 MUSD, while bilateral ODA amounted to 38.64 MUSD. In relation to 2008, total ODA has a decreasing trend, due to the difficult fiscal circumstances (approximately 55%), while ODA/GNI ratio dropped respectively from 0.21% in 2008 to 0.13% in 2018. However, it is noted that the average total ODA of years 2016-2018 is higher than in the years 2013-2015.

6.3.2 Bilateral cooperation

On the basis of the OECD Statistics (preliminary data for 2018)[34] the total bilateral ODA granted by Greece in 2018 amounted to 38.64 MUSD.

Total bilateral ODA granted by Greece in 2017 amounted to 85 MUSD. Bilateral assistance was mainly granted for in-donor refugee costs (68 MUSD), 13 MUSD for international organizations'

[34] At the time of writing this report, the annual report of the Greek Bilateral and multilateral official development co-operation and assistance for 2018 was not available. As such, the 2018 data used refer to preliminary data available at the OECD Statistics (stats.oecd.org).

programmes and funds (out of which the amount of 12.4 MUSD was contributed to the EU Facility for Refugees in Turkey for the approximately 3 million registered Syrian refugees) and 2.2 MUSD for scholarships of foreign students in Greece.

Categorizations of bilateral aid according to OECD/DAC statistical directives:

For 2018:

Aid Allocation by Geographical Region:

- Europe: 8.52 MUSD,
- Africa: 0.98 MUSD,
- America: -,
- Asia: 0.59 MUSD,
- Oceania: -
- Developing countries, unspecified: 26.63 MUSD.

Aid Allocation by Main Recipient Countries:

- Turkey: 6.42 MUSD,
- Albania: 1.38 MUSD,
- Ukraine: 0.36 MUSD,
- Serbia: 0.21 MUSD,
- West Bank and Gaza Strip: 0.19 MUSD,
- Lebanon: 0.13 MUSD.

For 2017:

Aid Allocation by Geographical Region:

- Europe: 14.3 MUSD,
- Africa: 0.9 MUSD (Sub-Saharan Africa 0,3 MUSD),
- America: 0.15 MUSD,
- Asia: 0.9 MUSD,
- Oceania: -

Developing countries, unspecified: 68.4 MUSD (including, inter alia, in-donor refugee costs in Greece). Aid Allocation by Main Recipient Countries:

- Turkey: 12.7 MUSD
- Albania: 1 MUSD,
- Syrian Arab Republic: 0.35 MUSD,
- West Bank and Gaza Strip: 0.2 MUSD,
- Serbia: 0.2 MUSD,

- Ukraine: 0.2 MUSD.

According to the OECD statistics, for 2018 (preliminary data), the Aid Allocation by Type of Aid and sector are:

Aid Allocation by Type of Aid:

- bilateral core contributions and pooled programmes and funds: 6.62 MUSD,
- project-type interventions: 0.01 MUSD,
- experts and other technical co-operation: 1.48 MUSD,
- scholarships and imputed costs of students from developing countries studying at Greek Universities: 2.59 MUSD,
- refugees in the donor country: 27.92 MUSD.

Aid Allocation by Sector of Aid:

- Social Infrastructure and Services: 2.16 MUSD
  - Education: 2.12 MUSD,
  - Health: 0.01 MUSD,
  - Government and civil society: 0.02 M USD,
  - Other social infrastructure and services: -
- Multisector/Crosscutting: 1.73 MUSD
  - General environmental protection: 0 MUSD
  - Other Multisector: 1.73 m. USD,
- Humanitarian assistance: 28.11 MUSD.

The respective information for 2017 is provided below:

Aid Allocation by Type of Aid:

- bilateral core contributions and pooled programmes and funds: 13.15 MUSD,
- project-type interventions: 0.01 MUSD,
- experts and other technical co-operation: 1.24 MUSD,
- scholarships and imputed costs of students from developing countries studying at Greek Universities: 2.22 MUSD,
- refugees in the donor country: 68.05 MUSD.

Aid Allocation by Sector of Aid:

- Social Infrastructure and Services: 1.35 MUSD
  - Education: 1.25 MUSD,
  - Health: 0.09 MUSD,

- Government and civil society: -,
- Other social infrastructure and services: 0.01 MUSD

- Multi-Sector/Crosscutting: 2.43 MUSD
  - General environmental protection: 0.23 MUSD
  - Other Multisector: 2.2 MUSD,
- Humanitarian assistance: 12.76 MUSD.

For years previous to 2017, please refer to BR3.

6.3.3 Multilateral contributions

Greek multilateral development assistance is granted by line Ministries which, depending on their purpose and responsibilities, disburse funds for international development purposes through International Organizations.

Total multilateral ODA subscriptions of Greece to International Organizations in the year 2018 amounted to 251.8 MUSD (0.12% of GNI), a fall by about 36% in relation to 2008 (391 MUSD). For 2017 the total multilateral ODA subscriptions amounted to 229 MUSD.

The EU with its member states is the biggest provider of development aid worldwide. It finances series of programmes in developing countries to build democratic systems of governance and effective public institutions, accountable to citizens. The EU is particularly concerned to ensure that funding provided for development is used effectively, and that EU institutions are fully accountable, not only to EU citizens but also to their developing partners.

As of July 2017, the EU as a collective is the largest contributor to the Green Climate Fund (GCF) with a total of US$4.66 billion committed (or "signed"), accounting for almost half of the USD 10.3 billion already raised. In 2015, the EU and member states contributed up to €17.6 billion (approximately USD 20.7 billion), which was channelled into climate change mitigation and adaptation initiatives in developing countries. This figure includes climate finance sources from public budgets and other development finance institutions, €1.5 billion from the EU budget and €2.2 billion from the EIB[35].

According to the preliminary data accessed by the OECD Statistics, total flows granted by Greece in **2018** to EU institutions for foreign development assistance amounted to about 213 MUSD.

[35] http://www.consilium.europa.eu/en/press/press-releases/2016/10/25-climate-change-finance/

ODA amounting to 15.8 MUSD was granted through the United Nations system, the amount of about 12.5 to the World Bank (of which about 2 MUSD were provided to the International Development Association (IDA) and the amount of 10.56 MUSD to diverse international organizations.

Total flows granted by Greece in **2017** to EU institutions for foreign development assistance amounted to 191 MUSD, of which 68 MUSD was the country's contribution to the European Development Fund (EDF). ODA amounting to 14 MUSD was also granted through the United Nations system, the amount of 16 MUSD to the International Development Association (IDA) of the World Bank and the amount of 8 MUSD to diverse international organizations.

Total flows granted by Greece in **2016** to EU institutions for foreign development assistance amounted to 191.45 MUSD, of which 61.42 MUSD was the country's contribution to the European Development Fund (EDF). ODA amounting to 12.98 MUSD was also granted in 2016 through the United Nations system mainly to UNDPKO (4.52 MUSD), WHO (2.21 MUSD), UN (2.08 MUSD), FAO (1.59 MUSD), UNESCO (0.87 MUSD), UNFCCC (0.14 MUSD), UNECE (0.07 MUSD), while the amount of 4.94 MUSD was granted to other International Organizations to implement development projects, mainly to CIHEAM and ISTA.

ODA amounting to 7.64 MUSD was also granted in **2015** through the United Nations system mainly to UNESCO, UNIDO, UNEP, UNDPKO, UNFCCC, FAO, WHO, WMO, while the amount of 1.27 m. USD was granted to other International Organizations to implement development projects, mainly to CIHEAM and ISTA.

In **2014**, total multilateral ODA contributions to International Organizations amounted to 201.34 MUSD or 151.75 MEURO (0.09% of GNI). Total flows granted by Greece to EU institutions for foreign development assistance amounted to 181.23 MUSD or 136.59 MEURO of which 89.05 MEURO accounted for Greece’s share to the EU budget for development cooperation, while 47.54 MEURO was the country's contribution to the European Development Fund (EDF). ODA amounting to 14.43 MUSD was also granted through the United Nations system mainly to UNESCO, UNIDO, UNEP, UNDPKO, UNFCCC, FAO, WHO, WMO, while the amount of 5.68 MUSD was granted to other International Organizations to implement development projects, mainly to CIHEAM, ICAC, IOM, ISTA, OIF (Francophonie).

In **2013**, total multilateral ODA contributions of Greece to International Organizations amounted to 195.45 MUSD or 147.21 MEURO (0.08% of GNI). In 2013 total resources granted by Greece to EU institutions for foreign development assistance amounted to 135.44 MEURO or 179.82 MUSD, of which, 88.95 MEURO accounted to Greece's share to EU budget for development co-

operation, while 46.49 MEURO was the country's contribution to the European Development Fund. In 2013 Greece also provided ODA amounting to 13.38 MUSD via the United Nations system. Funding was provided mainly through UNESCO, UNECE, UNIDO, UNEP, UNDPKO, UNFCCC, FAO, WHO, WMO. Finally, the amount of 2.26 MUSD was granted to other International Organizations such as, BSEC, CIHEAM, ICAC, IOM, ISTA, OECD.

Greece's overall ODA-eligible financial contributions towards Multilateral Organizations and programmes over the years 2008-2018 are listed in Table 58.

A substantial part of Greece's multilateral ODA is dedicated to organizations and/or programmes aiming to address global environmental issues and to support national sustainable development initiatives, including capacity-building activities related to technology transfer for limiting/reducing GHG emissions, implementation of the UNFCC Convention and preparations for effective participation in the Kyoto Protocol.

Greece, represented by the Ministry of Economy and Finance, has contributed to the Global Environment Facility's (GEF) Replenishments, as shown in Table 57. Greece participated in the financing of GEF from its 1st to 4th Replenishments (GEF 1 – GEF 4), by paying in full the amounts presented in Table 57. Greece has not committed to participate in subsequent replenishments after GEF4.

Contributions to United Nations Conventions and their Secretariats are channeled through other line Ministries, like MEEN.

Table 57 Financial Contributions to the Global Environmental Facility (GEF)

	Period	Contribution
Global Environmental Facility	July 1, 1994 to June 30, 1998 (1st Replenishment)	USD 5 million,
	July 1, 1998 to June 30, 2002 (2nd Replenishment)	SDR 4 million
	July 1, 2002 to June 30, 2006 (3rd Replenishment)	EURO 5,73 million
	July 1, 2006 – June 30, 2010 (4th Replenishment)	EURO 4,28 million

Source: Hellenic Ministry of Economy and Finance

Table 58 ODA eligible financial contributions to multilateral institutions and programmes (2008-2018)

Multilateral institutions and programmes	(in MUSD)										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018*
United Nations	14.19	13.75	12.85	12.15	10.15	13.38	14.43	7.64	12.99	13.63	15.79
European Union	238.87	286.06	277.60	256.36	204.05	135.44	181.23	157.90	191.45	191.24	212.99
World Bank Group	79.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.23	12.46
Regional Banks	44.27	0.72	1.01	0.00	0.69	0.00	0.00	0.00	0.00	0.00	3.40
Other Agencies	14.15	9.80	4.44	2.36	5.22	2.26	5.68	1.27	4.94	7.61	6.87
TOTAL	**390.99**	**310.33**	**295.90**	**270.87**	**220.11**	**195.45**	**201.34**	**166.82**	**209.45**	**228.71**	**251.51**

Source:
Years: 2008-2016 MFA/Hellenic Aid, Directorate 3, December 2017
Years 2017-2018 OECD Statistics

6.4 Technology development and transfer and Capacity-building

Access to knowledge and technologies are not enough on their own, the right set of specific local conditions needs to be in place to attract project developers and investors. This so-called 'enabling environment' involves a set of interrelated conditions - legal, organisational, fiscal, informational, political, and cultural. A skilled workforce is also crucial to maintain know-how in the community. Therefore, the successful transfer of climate technologies to developing countries requires support to increase local administrative capacities. The basis of the following technology transfer and capacity building activities, to which Greece participates, is the close cooperation with governments in developing countries to reinforce administrative capacities and support the development of legal and regulatory frameworks which are conducive to mitigating and adapting to climate change.

Greece's major policy objectives concerning international environmental co-operation include:

- contribution to the international efforts for promoting the implementation of the 2030 Agenda and the Sustainable Development Goals (SDGs), the Paris Agreement, as well as other international agreements and frameworks related to sustainable development, such as the Addis Ababa Action Agenda;

- contribution to sound environment management and sustainable development in Europe as an active Member State of the European Union;
- building strong "beyond borders" partnerships with partner countries that face similar challenges and share common goals, through bilateral and trilateral technical cooperation schemes, especially in its geographic neighbourhood, i.e. South-East Mediterranean and South-East Europe;
- enhance the country's engagement in multilateral and regional environmental bodies, e.g. UN Environment Programme (UNEP), International Maritime Organisation (IMO).

Greece, a member state of the United Nations and the European Union, has been pursuing sustainable development and equitable growth in accordance with international and European policies and strategies for decades. At the international level, Greece had been a devoted member of the UN Commission on Sustainable Development (UNCSD) for 20 years, from 1992 to 2012. Greece was an active participant at the UN Rio Summit (1992), at the UN Johannesburg Summit on Sustainable Development (Rio+10, 2002) and at the UN Rio+20 Summit (2012). Subsequent to the Rio+20 Summit, the UN High-Level Political Forum on Sustainable Development (HLPF) and the UNGA Open-Working Group (OWG) were established. Their purpose was to propose a set of global sustainable development goals (SDGs). Greece participated constructively in the post-2012 negotiation process leading in September 2015 to the adoption of the 2030 Agenda and the SDGs.

The 2030 Agenda and the SDGs shape the Greek Government's global engagement. The common global vision and ambition expressed in the SDGs are in line with the interests, values and principles for which Greece has worked globally for decades. Having been stricken hard by the economic crisis over the past eight years -a crisis that forced a focus towards economic policies that often create divergence rather than contributing to achieving sustainable development- combined with the humanitarian crisis of the refugee inflows, Greece sees the 2030 Agenda and the SDGs as a visionary and transformative framework for a new, equitable and sustainable development path.

Greece's development activities in the field of climate change are based on, and emphasize the importance of, the principles of national ownership, stakeholder participation, country driven demand, cooperation between donors and across programmes, and impact assessment and monitoring (when appropriate).

The provision of technology development and transfer and capacity building support by Greece to non-Annex I Parties is presented in the next paragraphs and in ***CTF Table 8 and 9***.

6.4.1 Multilateral/Regional cooperation

6.4.1.1 Mediterranean Component of the EU's Initiative 'Water for Life' (MED EUWI) (capacity building activity)

In the follow up of the World Summit for Sustainable Development (WSSD), the Greek Government (Hellenic Ministry of Environment, Energy and Climate Change – MoE - and Hellenic Ministry of Foreign Affairs – MoFA), supported by the 'Global Water Partnership-Mediterranean' (GWP-Med) Secretariat, has undertaken responsibility of leading the Mediterranean Component of the EU's Initiative 'Water for Life' (MED EUWI), launched in Johannesburg, in 2002.

MED EUWI represents a strategic partnership among stakeholders (national, regional and international) in the Mediterranean region. It seeks to make significant progress in poverty eradication and health and the enhancement of sustainable livelihoods and socio-economic prosperity and growth in the developing countries of the Mediterranean and South-Eastern Europe. Through its work, MED EUWI aspires to provide a catalyst for peace and security in a region that is particularly vulnerable and susceptible not only to environmental, but also to political distress.

Its main aim is to assist the design of better, demand-driven and output-oriented water programmes in the region, and to facilitate the effective coordination of water programmes and projects, targeting more effective use of existing funds, through identification of gaps.

MED EUWI develops its activities through annual work programmes, supported through the participation of a variety of institutions and stakeholders. According to MED EUWI's precedence, national activities up until 2015 focus on:

i. prioritisation of national needs for the water sector in order to meet national development targets;
ii. assistance to national water planning activities including assistance to countries for the elaboration, implementation and monitoring of IWRM plans and linking them with national climate change adaptation strategies and other water-related sectoral plans;
iii. development of sustainable financing strategies for the water sector;
iv. improved donor coordination, harmonisation and alignment on the ground.

In this respect, synergies and complementarity are systematically sought and ensured between MED EUWI and any other related Initiative and Programme active in the Mediterranean including the Horizon 2020 Initiative to "De-pollute the Mediterranean by 2020", the EU-supported

"Sustainable Water Integrated Management (SWIM)" Programme (2011-2014), the GEF MAP UNEP Strategic Partnership for the Mediterranean Large Marine Ecosystems (2007-2014), etc.

Over its 10 years of operation, the MED EUWI has managed to receive a very wide acceptance as it is acknowledged by all Mediterranean partners as a key "platform" in the region aiming to assist meeting the international commitments on water contributing at the same time towards aid effectiveness. In the period 2010-2012, Country Dialogue activities were implemented in Lebanon and Tunisia comprising National Assessments on Private Sector Participation in Water Infrastructure, including those related to climate change adaptation, based on extensive consultation with involved stakeholders. Furthermore, support was provided to Lebanon in preparing its National Water Sector Strategy and advancing elements of its National IWRM Plan.

In terms of funding, MEECC has been supporting the MED EUWI with a core annual budget reaching approximately 90.000 € so far until 2011 to cover "horizontal" activities. In 2006, a co-funding by the EU Commission (EuropeAid Cooperation Office) was activated to financially support selected MED EUWI activities, for 2 years (2006-2008), with the amount of approximately 1,070 million €. Moreover, in 2010, a new co-funding by the EU Commission (DG DEVCO) was again activated to financially support selected MED EUWI activities, for 3 years (2010-2012), with the amount of approximately 1 million €. Furthermore, the MED EUWI has managed to mobilize and coordinate considerable additional funding for the region. Key contributors in the process include, apart from the EC, bilateral EU ODA, the GEF, Development Banks, etc.

In the context of the MED EUWI, increasing emphasis is being given to assisting the efforts of Mediterranean countries to build their adaptation capacities to the changing climate conditions in the Region. More specifically, Greece/MEECC, through the MED EUWI, has:

- Prepared a Position Paper on "Climate Change Adaptation and Integrated Water Resources Management in the Mediterranean" in December 2007 that has been widely distributed and discussed among Med partners aiming to provide a background of the current condition regarding impacts of climate change in the Mediterranean with emphasis on water resources, to assist Med countries with a systematic framework for developing national adaptation strategies linked with national IWRM plans as well as to promote a harmonised regional approach to address adaptation to climate change, under the MED EUWI umbrella.

- Organised, together with the European Commission, the Mediterranean Action Plan/United Nations Environment Programme, the Global Water Partnership – Mediterranean (GWP-Med) and the Mediterranean Information Office for Environment, Culture and Sustainable Development

(MIO-ECSDE), a Side-Event on "Addressing Climate Change Adaptation Challenges in the Mediterranean" during the 16th Session of the UN Commission for Sustainable Development, in May 2008. The Side-Event, that was attended by more than 40 participants, aimed at addressing issues pertaining to the specificities of the Mediterranean which, already a water-scarce region, is expected to face even more challenges with regard to its water resources in the near future due to the looming climate crisis (e.g. increasing frequency and severity of droughts, floods and other extreme weather conditions that lead to increased water supply-demand gap, desertification, infrastructure damage, loss of land due to landslides, saltwater intrusion due to sea-level rise, health issues, etc.), jeopardising the region's overall well-being.

- Organised, in the context of MED EUWI, an International Workshop on "Water and Climate Change in Southeastern Europe: Understanding Impacts & Planning for Adaptation" in June 2008, in Tirana, Albania, targeting SE European Countries.

- Prepared a detailed Technical Background paper on "Climate Change Adaptation and Integrated Water Resources Management in the Mediterranean" that was presented to and discussed with Water Directors of "Union for the Mediterranean" (UfM) countries during their Meeting organised by Greece/MED EUWI in Athens in July 2008. Consequently this Technical paper was presented and adopted by UfM Water Ministers at their Ministerial Conference on Water, in Jordan (Dead Sea), in 22 December 2008. This UfM Ministerial Conference on Water decided to elaborate a "Mediterranean Strategy on Water" to be adopted by the next UfM Ministerial Conference on Water to take place in 2010. The Strategy was decided to comprise four main themes, i.e. water governance, water demand management, water financing and adaptation of water resources to climate change. The Chapters on water governance and on adaptation of water resources to climate change have been compiled with the MEECC as their main author. Moreover, MED EUWI has provided overall technical and administrative assistance to the Union for the Mediterranean for the overall process of the elaboration of the Strategy. Unfortunately, to date, the draft Strategy on Water in the Mediterranean is still pending official adoption due to political reasons.

- Actively participated, during the 5th World Water Forum in Istanbul (16-22.3.09) at the Ministerial Roundtables on "Water and Climate" and "Integrated Management of Coastal Strips in relation with IWRM" where it made several practical proposals for achieving adaptation to climate change by operationally linking integrated water resources management with national adaptation strategies using as a catalyst education, public awareness and changes in consumption patterns.

- Aiming to additionally contribute to the elaboration of the above mentioned Strategy for Water in the Mediterranean as well as to produce a "Mediterranean Statement" that will be fed and

submitted to the UNFCCC COP15 in Copenhagen, December 2009, Greece/MED EUWI technically assists the organisation of the Joint Egyptian-Dutch Water Conference entitled "Towards the new Long Term Strategy for Water in the Mediterranean", that will be held 2-3 November 2009, in Cairo, Egypt. The Conference, inter alia, will address the four themes of the Strategy, i.e. short water governance, water and climate change, water financing, and water demand management.

- Elaborated, in 2012, a brief overview of regional initiatives and programmes on climate change adaptation in the Mediterranean which has been used as background for regional institutions (e.g. UfM, EC) and Programmes (e.g. SWIM, GEF MAP UNEP Climate Variability and Change, etc.).

- Moreover, in 2012, established synergies with the GEF MAP/UNEP Climate Variability and Change Project (2012-2014) and with the AMCOW/GWP Water, Climate and Development Programme (2012-2016).

- Elaborated, in 2013, an assessment of capacity building needs on climate change adaptation in North Africa.

6.4.1.2 Regional cooperation on environmental protection within the Black Sea Economic Cooperation (BSEC) Organisation (technology transfer activity and capacity building)

Greece, as a member of the Black Sea Economic Cooperation Organization (BSEC), is actively engaged in efforts initiated by the Permanent International Secretariat of BSEC (PERMIS) to promote cooperation and exchange of best practices for mitigation and adaptation of climate change, energy efficiency and green energy investments issues.

These priority issues are quoted in: i) "Declaration of the Ministers in charge of energy of the BSEC Member States on the enhancement of the gas infrastructure development (Belgrade, 11 April 2012)" (Annex VI to BS/ENM/R(2012)1), ii) "Joint Belgrade Declaration on Climate Change and Green Economy - BSEC Contribution to Rio+20" (23 April 2012) and iii) the "Plan of Action of the BSEC Working Group on Energy for the period 2015-2017".

More specifically in the first document the Ministers agree to "explore possibilities for improvement of investment opportunities in the energy sector of the BSEC Member States for upgrading infrastructure and promoting energy efficiency in the BSEC Region". In the second, they have expressed their determination "to enhance cooperation among the BSEC Member States on promotion of policies and actions aimed at combating climate change" and to "encourage the Member States to develop their national green economy pathways and low carbon policies and

enhance appropriate measures". In the last one they plan to focus on: "I. Exchange of information on legislation in energy sector and national programs; II. Sustainable energy development; and the III. Development and improvement of energy infrastructure in the Black Sea region".

Under this framework the Hellenic contribution aims to assist, through the BSEC, the other Member State governments and non-state actors to fulfil the aforementioned commitments and to deliver increased ambition for the achievement of the Paris Agreement.

To that aim the Hellenic government, mainly through the Energy Policy and Development Centre (KEPA) of the National and Kapodistrian University of Athens (NKUA), endorses actions, that:

- ✓ support mainly the regional policy dialogue for green energy investments and the 2020 revision of the Nationally Determined Contributions (NDCs) for identifying opportunities to close the 2030 emissions gap;
- ✓ concluded with and promote further the development of the "BSEC – Green Energy Network", as a knowledge and green investment hub for the BSEC region;
- ✓ result to the organization of "Green Investment Forum" in Greece and to the other BSEC Member States.
- ✓ facilitate "knowledge transfer" and "capacity building" on Climate Change Policy issues;
- ✓ assist BSEC countries to design and implement new policies and actions to achieve their NDC pledges;
- ✓ contribute to the achievement of Sustainable Development Goals;
- ✓ provide them tools for facilitating the development of their forward-looking scenarios and evaluating the effectiveness of their policy mixtures towards their commitments on climate change issues.

The BSEC Green Energy Network

The "BSEC – Green Energy Network" was launched as the consequence of an initiative undertaken by the Hellenic Government to establish a "Task Force on Green Energy Development". This led PERMIS to invite KEPA for the development of the "BSEC – Green Energy Network" between administrative bodies and/or Centres and organizations mandated to promote renewable energy sources and energy efficiency measures and policies (BS/EN/WG/TF/R(2014)2). The network is coordinated by KEPA under the supervision of PERMIS.

This activity started after the decision of the Ministers of Energy of the Black Sea Economic Cooperation Organization (BSEC), during their meeting at Nafplion (Greece, 12 Oct. 2010)36, to set up a Task Force with the aim to identify relevant issues within which regional cooperation can be most effective, and also to explore ways to promote green energy investments and innovative green energy projects (Declaration concerning "Green Energy Development Initiative" - BS/EN/WG/R(2010)2). In accordance with the Declaration of the Ministerial Meeting in Nafplion (Greece) on 12 October 2010, a "Task Force on Green Energy Development" was set-up within the BSEC Working Group on Energy, with the aim to identify relevant issues within which regional cooperation can be most effective, and also to explore ways to promote green energy investments and innovative green energy projects.

The Task Force started working in April 2012; agreed on the creation of the aforementioned Network and decided to elaborate a BSEC Green Energy Strategy Paper (BS/EN/WG/TF/R(2012)1). In fact, the BSEC Economic Agenda 2012 provides for taking gradual steps to materialize the vision of transforming the BSEC Region into a model for clean energy by the year 2050.

During its meeting in Thessaloniki in December 2014, the Council of the Ministers of Foreign Affairs decided to transfer the activities and functions of the Green Energy Development Task Force to the BSEC Working Group on Energy (BS/FM/R(2014)2 and Annex VII to BS/FM/R(2014)2). The Working Group on Energy decided to continue the work on the development of a Green Energy Strategy Paper (BS/EN/WG/TF/R(2014)2). Member States were invited to continue to contribute to the development of the document and assure the presence of their experts at the forthcoming meetings of the Working Group.

Furthermore, the BSEC Green Energy Network was established by the decision of the Council of Ministers of Foreign Affairs taken on 12 December 2014. The mandate of the Network is to facilitate exchanging information and sharing experience and know-how among national administrative bodies and/or centres and organizations mandated to promote renewable energy sources and energy efficiency measures and policies in the BSEC Region. In accordance with the agreements reached in the Task Force on Green Energy Development and in the Working Group on Energy, the BSEC PERMIS invited the Energy Policy and Development Centre (KEPA) of the National and Kapodistrian University of Athens to develop the Network, under the supervision of

[36] The ministerial conference was held in Nafplio, Peloponnese, in the framework of the Greek presidency of the BSEC, with the focal message being "The Black Sea turns Green." At: http://www.bsec-organization.org/bsecnews/BSECinMedia/Downloads/EMG%20(13.10.2010).pdf

the BSEC Permanent International Secretariat, in terms of both partners and activities to be undertaken (BS/EN/WG/TF/R(2014)2).

The Network started to function in 2015 and is endeavouring to undertake and facilitate actions at international, regional and national levels with a view to developing, transferring and exchanging updated knowledge, including consultations for the development and assessment of specified green policy mixtures and actions.

Members of the Network are expected to organize and participate in regional/international activities, such as workshops, seminars and conferences. They can take advantage of the existing communication infrastructure of KEPA – scientific journals, periodical editions, newsletters – to increase the level of cooperation among them and their national stakeholders.

They are welcome to contribute to enhancing the knowledge transfer and capacity building of their governments, updating them on the state of the emerging international "green policy" instruments.

It is expected that the Network contributes, through knowledge dissemination, to encouraging market stakeholders to take advantage of existing international financing opportunities and convince regional and national banking institutions to enhance their "green" programs.

Finally, members of the Network are facilitated through brokerage events to participate in internationally financed programs, like those of H2020 of the European Union, or to develop ad hoc "tailor made" consortia upon requests from the BSEC Member States.

Activities

October 2016

BSEC PERMIS and the BSEC Green Energy Network, coordinated by KEPA, organized the 1st Green Energy Investment Forum as part of the 9th International Scientific Conference on "Energy and Climate Change" that took place at the History Museum of the National and Kapodistrian University of Athens during 12-14 October 2016, in Athens, Greece.

The Forum aimed to the promotion of green energy investments (policies, advanced technologies, finance, current trends and the considered in the market investment opportunities); this was the main content of the policy statements of the speakers.

Speakers were from the Ministry of Interior and Administrative Reconstruction, the United Nations Academic Impact (UNAI), BSEC-PERMIS, the Embassies of Romania and Ukraine, the Parliamentary Assembly of BSEC-PABSEC, the Hellenic Ministry Foreign Affairs, the Hellenic-

Russian Chamber of Commerce; the Hellenic Association of Computer Engineers; the Hellenic Petroleum; the Bank of Greece; the Central Union of Municipalities (K.E.D.E.); the Enterprise Greece; the Institute of Energy for SE Europe (IENE); and AppArt.

The next two days were devoted to presentations of scientific papers and to the brokerage session of the event. The Conference was under the aegis of the Black Sea Economic Cooperation (BSEC) and the United Nations Academic Impact (UNAI).

December 2016

During its meeting on 1st December 2016, the BSEC Working Group on Energy invited the Member States to nominate national governmental bodies, academia, research institutions, companies active in the area of Green Energy to participate in the BSEC Green Energy Network. It also invited Member States to express (if they had not done so already), their agreement with the inclusion in the Network of research institutes and universities which were interested to participate and to directly contact with KEPA (BS/WG/EN/R(2016)2).

The Working Group also: i) took note of the project proposals prepared by the BSEC Green Energy Network, under the coordination of KEPA, in consultation with the BSEC PERMIS, to be further elaborated and finalized, so as to be submitted for funding by international financial institutions and other donors. ii) welcomed the organization of the BSEC Green Energy Investment Forum on in Athens, by the BSEC Green Energy Network, and expressed its support for having an Investment Forum bi-annually, bringing together government officials responsible with the promotion of Green Energy, representatives of the banking sector, the business communities and NGOs. iii) took note of the intention of the KEPA to examine the development of a BSEC Green Energy Investment Fund, with the possible cooperation of the Black Sea Trade and Development Bank (BSTDB) and the BSEC PERMIS, to be supported by the Green Climate Fund (GCF) and Green Environment Facility (GEF) funds.

June 2017

During the meeting of the BSEC Working Group on Energy (15 June 2017) (BS/WG/EN/R(2017)1) the delegation of the Republic of Azerbaijan presented the list of organizations to be included in the BSEC Green Energy Network of Cooperation.

October 2017

BSEC PERMIS and the BSEC Green Energy Network, coordinated by KEPA, organized the 2nd Green Energy Investment Forum as part of the 10th International Scientific Conference on

"Energy and Climate Change" that took place at the cultural center of NKUA "Kostis Palamas" building during October 11-13, 2017 in Athens, Greece.

The Forum again aimed to the promotion of green energy investments (policies, advanced technologies, finance, current trends and the considered in the market investment opportunities); this was the main content of the policy statements of the speakers.

Speakers were from UNAI, BSEC-PERMIS, the Embassies of Ukraine, Romania, Moldova, the Parliamentary Assembly of BSEC-PABSEC, the European Bank of Reconstruction and Development (EBRD); the Black Sea Trade and Development Bank (BSTDB); Minister of Economy and Development-Hellas; Hellenic Petroleum; the Public Natural gas Supply Corporation (DEPA); Network of Sustainable Greek Islands (DAFNI); the Institute of Energy for S.E. Europe (IENE); the Hellenic Association for Cogeneration of HEAT & Power; and the Renewable Energy Development Pro Consultants – Hellas.

The whole event is part of the PROMITHEASnet activities and is organized annually by the KEPA. The Conference was under the aegis of the Black Sea Economic Cooperation (BSEC) and the United Nations Academic Impact (UNAI).

November 2017

BSEC PERMIS and the BSEC Green Energy Network, coordinated by KEPA, organized a Green Energy Investment Forum at the BSEC PERMIS Headquarters in Istanbul on the 24th of November 2017. Representatives of BSEC Member States, Related Bodies and Observers, of international organizations and financial institutions participated in the event (BS/INFO.2017.0550).

Representatives of the Black Sea Trade and Development Bank, the Delegation of the European Union to the Republic of Turkey, the European Bank for Reconstruction and Development and the United Nations Development Program presented their Green Investment policies on Energy Efficiency in the BSEC Member States.

Experts from KEPA made presentations under the session "Overcoming Behavioral Barriers in Energy Efficiency Policies - the HERON Project" about effective Energy Efficiency policies and optimum Energy Efficiency scenarios in three BSEC Member States.

Finally, the case of developing project proposals, in the frame of the Network activities, relevant to "smart Nearly Zero Energy Building (NZEB)" in three BSEC – Member States was considered in the perspective of encouraging them to benefit from the GCF funding capacities.

October 2018

The annual 11th International Conference for "Energy and Climate Change" took place during 10-12 October 2018. The event was organized by the Energy Policy and Development Centre (KEPA) of NKUA. The Conference was under the aegis of the Black Sea Economic Cooperation (BSEC), the United Nations Academic Impact and the General Secretariat for Research and Technology (GSRT) and was divided in 3 parts; the first was devoted to the 3rd "Green Energy Investments" Forum aiming to bring together policy and decision makers to explore opportunities for investment that promote the transition to a low carbon economy. The second "Scientific Sessions" was devoted to peer – viewed presentations and discussions on relevant to energy and climate change research topics. Finally, the third is shaped as a "Brokerage session" that will bring together scientists, policy makers and market stakeholders and facilitate them to present their activities (projects and programs), discuss about funding opportunities, in the context of Horizon 2020 calls and finally to increase the cross-interaction on innovative ideas and cooperation on common importance topics.

Knowledge transfer and capacity building activities in the Black Sea Economic Cooperation region

During the last five years BSEC governments and non-state actors have been offered assistance on knowledge transfer and capacity building regarding climate change issues through the following activities:

1. **Projects** facilitated BSEC institutes in developing scenarios, designing policies and using new tools. More specifically:

    a. *PROMITHEAS-4: Knowledge transfer and research needs for preparing mitigation/adaptation policy portfolios* (Implementation period: 2011 – 2013) – **Funding source:** EU FP7. **Amount:** 1,000,000€. **Type:** Coordination and support. **Aim:** The development and evaluation of Mitigation/Adaptation (M/A) policy portfolios and the prioritization of research needs and gaps for twelve (12) countries (Albania, Armenia, Azerbaijan, Bulgaria, Estonia, Kazakhstan, Moldova, Romania, Russian Federation, Serbia, Turkey and Ukraine) characterized as emerging economies. Sixteen (16) institutions from fourteen (14) countries (the twelve aforementioned ones plus Austria and Hellas) participated at the consortium with NKUA-KEPA as the coordinator.

    In the framework of the PROMITHEAS-4 activities an *International case Study Seminar about Mitigation/Adaptation policy portfolios* was held during 3 – 7 December 2012 at the KEPA premises in Athens. It was a case study seminar for the countries of BSEC,

Estonia and Kazakhstan, following the four months teleteaching courses of PROMITHEAS - 4. PROMITHEAS - 4 covered travel and accommodation expenses for 2 persons coming from beneficiary countries and with passing grades in these tele-teaching courses. Available information at: http://www.promitheasnet.kepa.uoa.gr.

b. *HERON: Forward-looking socio-economic research on Energy Efficiency in EU countries (2015-2017)* – **Funding source:** EU HORIZON 2020. **Amount:** 958,750€. **Type:** Research and innovation project. **Aim:** Facilitate policy makers of multi-level governance in EU, to develop and monitor energy efficiency policies in building and transport sectors, through forward-looking socio-economic research in seven EU (Belgium, Bulgaria, Estonia, Germany, Hellas, Italy, and United Kingdom) and one candidate (Serbia) countries. NKUA-KEPA was the coordinator of the project (Available information at: http://heron-project.eu/).

   HERON – Decision Support Tool (methodology/software) developed by NKUA-KEPA in cooperation with App-Art for the software part, provides the policy makers with a user's-friendly software that facilitates them in the selection of the optimum combination of technologies and practices minimizing the negative impact of end-users behavior in the implementation of Energy Efficiency scenarios. HERON - DST outcomes were used as inputs to LEAP for developing scenarios and their respective policy mixtures for seven countries (six EU Member States and one candidate one). *The software was disseminated free of charge to all BSEC – MS through the BSEC – PERMIS while a special presentation was made during the "Green Energy Investment Forum" in Istanbul (Nov. 2017).*

2. **Editions** allowed the dissemination of information about green energy investments per BSEC Member State and presented the efforts of these countries towards climate change issues. More specifically, these editions are:

   a. *"Energy View of BSEC Countries 2008*», biennial, published since 2009.

   b. "*Special edition on Climate Change policies: Energy View of BSEC Countries 2012*", published in 2012 under the framework of the PROMITHEAS-4 activities.

3. The **PROMITHEAS Newsletter** (bimonthly) allows BSEC entities (Ministries, agencies, research centres, universities, academia, consultants, SMEs etc.) activated in energy and climate change issues to be informed about recent developments on these issues and to present their relevant activities and policies. KEPA prepares and disseminates the PROMITHEAS newsletter to approximately 26,000 recipients in 170 countries for the last ten years.

4. The **Scientific Journal** (bilingual (in English and Russian)) titled *"Euro-Asian Journal of Sustainable Energy Development"* allows, mainly but not exclusively, to the scientific potential of EU and BSEC Member States (MS) to present their research work on climate change, energy and sustainable development issues. The journal is published by KEPA since 2008 and receives ISSN numbers for printed and electronic versions.

5. The **PROMITHEAS Network on Energy and Climate Change policy issues** allows to scientific entities of the BSEC region to interact, exchange views and cooperate on research issues for climate change, energy and sustainable development. Also, in the frame of the network activities, consortia are formed and submit research proposals to funding mechanisms such as HORIZON 2020, Europaid etc. KEPA is the coordinator of the PROMITHEASnet, The Energy and Climate Policy Network, which consists of participants from 16 countries mainly coming from the Black Sea, Caspian Sea and Central Asia regions (Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Hellas, Kazakhstan, Kyrgyzstan, Moldova, Romania, Russian Federation, Serbia, Tajikistan, Turkey, Ukraine and Uzbekistan). There is one member from the Mediterranean (Lebanon). It was established in 2005 as a BSEC Project Development Fund (PDF) project with NKUA-KEPA as the coordinator. It aims to promote cooperation between EU and BSEC relevant institutions and, through this, to enhance bonds of scientific cooperation, knowledge transfer and dissemination, to contribute to economic issues relevant to its contents and to regional stability and economic development (see at: http://www.promitheasnet.kepa.uoa.gr).

6. A number of **events** are organized for reinforcing the skills of the scientific and research potential of the BSEC region. These are:

   a. *Annual International Conference on Energy and Climate Change* (Implementation period: 2008-2019) – **Funding source:** self-funded, sponsored by funding agencies (banks) and energy companies, registration fees from attendees. **Aim:** This Conference started as an activity of a FP6 funded project and has developed into an annual International Conference for scientists and researchers working in energy and climate change policy issues. It is hosted by the oldest university of Greece, the National and Kapodistrian University of Athens (NKUA); organized by the NKUA-KEPA, coordinator of the PROMITHEAS Network and set under the aegis of the BSEC Organization and of the United Nations Academic Impact (UNAI). KEPA is member of UNAI since year 2011.

The Conference, starting from 2013, is scheduled to promote the Green Economy issue and following its structure to bring together members and representatives from the scientific community, governmental authorities, members of parliaments, market stakeholders, banking officers and representatives from international and regional organizations. The last two years the Conference is divided into three (3) main parts.

The "*Green Energy Investments Forum*" on the first day, is organized in cooperation with the Permanent International Secretariat of the Organization of the Black Sea Economic Cooperation (***BSEC PERMIS***) and aims to reinforce the regional and extroverted cooperation among educational institutes, market forces, banks and governments for "green energy" issues.

The second "*Scientific papers*" is devoted to peer – viewed presentations and discussions, as in all previous years. Scientists and researchers mainly from EU and BSEC countries participate and present their work.

Finally, the third is shaped as a *"Brokerage session"* that brings together scientists, policy makers and market stakeholders and facilitate them to present their activities (projects and programs), discuss about funding opportunities, especially in the context of Horizon 2020 calls and finally to increase the cross-interaction on innovative ideas and cooperation on common importance topics.

Proceedings receive ISBN numbers for printed and electronic version.

The Hellenic Government in addition to the annually organized forum in Athens supports the organization of biannual forum in all BSEC- MS during their Chairmanship in Office of BSEC, as a concrete contribution to knowledge transfer and green investment facilitation for all BSEC – MS.

Available information at: http://www.promitheasnet.kepa.uoa.gr.

b. *International Training Seminar on Climate Change Policies* (Implementation period: 2013) – **Funding source:** self-funded/registration fees from attendees. **Aim:** Organised by NKUA-KEPA in cooperation with the US center of Stockholm Environment Institute in Massachusetts and developer of LEAP (Long-range Energy Alternatives Planning system), the "International Training Seminar on Climate Change policies" was an one-week training activity aiming to offer to policy makers a holistic approach in designing climate change policy strategies through the development and evaluation of policy mixtures. Trainees got updated on global policy

trends, reliable data collection, scenarios development and selection of policy mixtures with the use of LEAP and their evaluation with the use of AMS method. The training seminar was attended by policy and decision makers (employees of ministries and agencies, consultants), economists, engineers, project managers, researchers on energy and climate change policy from Albania, Azerbaijan, Greece, India, Kuwait, Portugal, Romania, and South Africa and took place in the premises of University of Athens on the second week of November 2013. Both LEAP and AMS have been used for the development and evaluation of M/A policy portfolios for twelve (12) countries of Black Sea and Central Asia. Available information at: http://www.promitheasnet.kepa.uoa.gr

6.4.1.3 Trilateral cooperations

In the Eastern Mediterranean Region and under the overarching umbrella of the Barcelona Convention, two trilateral schemes of technical cooperation and partnership have been recently initiated, at a high political level, between Greece, Cyprus and Israel and between Greece, Cyprus and Egypt, in 2016 and in 2017, respectively. The ultimate objective of these cooperative schemes is to enhance peace and stability in the region and facilitate the sharing of experiences, knowledge and know-how in order to promote joint projects of mutual interest, find solutions to common concerns and promote interconnectivity and complementarity of actions.

More specifically:

Trilateral Cooperation in the field of Environment between Greece – Cyprus – Israel

The trilateral cooperation was initiated in April 2016 and each year a Summit between the tree Prime Ministers is held in one of the three countries, in rotation, usually with a back-to-back Ministerial Meeting of Environment Ministers. The cooperation is based on the Barcelona Convention and its legal instruments and is intended inter alia to further strengthen their implementation at a sub-regional level.

The thematic areas identified for the trilateral cooperation since the beginning, as issues of common concern, are three, namely:

- protection of the marine environment of the Mediterranean (covering also issues related to satellite monitoring of the coastal and marine environment), led by Cyprus;
- climate change adaptation (with emphasis on developing common set of indicators for climate change adaptation), led by Greece; and

- water and wastewater management with emphasis on olive oil wastewater that will be expanded to cover also issues related to management of sewage sludge, led by Israel.

The three countries have also agreed to exchange best practices and experience gained for capacity building at country level, on processes to adapt and implement the UN Global Sustainable Development Goals (SDGs).

During the 1st Meeting of the three Ministers of Environment (April 2016), a joint trilateral Working Group was established, that agreed that:

- a trilateral Ministerial Meeting on Environment will be held once a year (as stated above),
- the joint trilateral Working Group will meet at technical level, three times a year, on each one of the three above mentioned thematic areas (including on climate change adaptation, depending on needs and progress achieve.

So far, the trilateral Working Group has met three times, at technical level, as follows:

- On 2nd February 2017 in Athens on climate change adaptation
- On 9th February 2017 in Tel Aviv, on water and wastewater management, and,
- On 23 February in Nicosia on the protection of marine environment from pollution and in particular from oil spills.

Trilateral Cooperation in the field of Environment between Greece – Cyprus – Egypt

The trilateral cooperation was initiated in October 2016 and each year a Summit between the tree Prime Ministers is held in one of the three countries, in rotation, usually with a back-to-back Ministerial Meeting of Environment Ministers. The cooperation is based on the Barcelona Convention and its legal instruments and is intended inter alia to further strengthen their implementation at a sub-regional level.

The thematic areas identified for the trilateral cooperation in May 2017, as issues of common concern, are five, namely (i) preparedness and response to major marine pollution incidents in the Mediterranean; (ii) combating coastal erosion and coastal zone management; (iii) biological diversity and nature protection; (iv) waste management; and (v) climate change adaptation (with emphasis on the exchange of information on monitoring and observation mechanisms, on best practices and on know-how including on climate adaptation indicators and climate adaptation web applications and tools, aiming to create a solid knowledge-base for adaptation approaches tools/methods that can be compatible to all parts).

Given the cross – border nature of many environmental issues that require cooperation at sub-regional, regional and global levels, as well as the challenges facing the Mediterranean Region with regard to environmental protection, under the first, abovementioned, thematic area, the three countries have submitted, in November 2018, an official Letter to the UNEP/MAP Coordinator requesting the support of the UNEP/MAP – Barcelona Convention system for the elaboration of a Sub-regional Marine Oil Pollution Contingency Plan and of its accompanying Implementation Agreement pursuant to the Protocol concerning Cooperation in Preventing Pollution from Ships and in Cases of Emergency Combating Pollution of the Mediterranean Sea, in the framework of the Barcelona Convention.

Finally, during the recent Trilateral Summit held in Crete, Greece, in October 2018, an MoU was signed between the three countries on Education 2019 – 2022, including on Environmental Education and Education for Sustainable Development in line with the related SDG (SDG 4) provisions, for advancing implementation of the abovementioned Action Plan of the MSESD.

6.4.1.4 The H2020 CB/MEP programme of capacity building (capacity building activity)

The "Horizon 2020 Initiative" aims to de-pollute the Mediterranean by the year 2020 by tackling the sources of pollution that account for around 80% of the overall pollution of the Mediterranean Sea: municipal waste, urban waste water and industrial pollution. Horizon 2020 was endorsed during the Environment Ministerial Conference held in Cairo in November 2006 and is one of the key initiatives endorsed by the Union for the Mediterranean (UfM) since its launch in Paris in 2008.

To implement and monitor actions three working groups were created to address:

-Specific Investments for Pollution Reduction (PR);

-Capacity Building (CB) for achieving H2020 objectives;

-Review, Monitoring and Research (RMR).

With the launch of the Union for the Mediterranean the geographic scope of Horizon 2020 was expanded to include focal points from Albania, Bosnia & Herzegovina, Croatia (not an EU Member State at the time) and Montenegro. Greece is a member of the consortium of the Capacity Building component of the Horizon 2020 Initiative for the de-pollution of Mediterranean Sea and participates actively in the process of identification of areas within the scope of H2020 where regional capacity building would add value.

Currently we are running in the 2nd working phase of the programme (years 2015-2020). The current activities of the H2020 Capacity Building Sub Group are supported by the EU-funded Sustainable Water Integrated Management – Horizon 2020 Support Mechanism project (SWIM-Horizon2020 SM).

6.4.2 Bilateral cooperation (technology transfer activities)

Hellenic Aid finances projects in a number of developing countries, aiming to facilitate the access to, or transfer of environmentally sound technologies and to promote the use of RES in developing countries as well as in countries with economies in transition. In addition, the Hellenic Centre for Renewable Energy Sources participates in technology transfer/capacity building projects financed by the EU and by national funds. A number of such projects are listed, on an indicative basis, in Table 59.

Table 59 Description of selected projects or programmes that promoted practicable steps to facilitate and/or finance the transfer of, or access to, environmentally-sound technologies

Project title: "SYN-ENERGY" **Recipient countries**: Albania, Bosnia-Herzegovina, Croatia, FYROM, Moldavia, Montenegro, Serbia, Georgia, Ukraine **Total funding**: Hellenic Aid: 4.000.000 €/ USAID: 4.000.000€ **Implementation:** Hellenic Center for Renewable Energy Sources (CRES) / International Resources Group/Alliance to Save Energy (IRG/ASE) **Project description:** ■ Regional assessment of RES ■ E.E. in residential and public buildings ■ Strategic planning for RES and E.E. ■ Capacity building and institutional network development **Technology transferred**: EE and solar equipment, transfer of knowhow in RES and EE
Project title: Applications of Renewable Energy and Energy Saving methods **Recipient Country:** Lebanon **Total funding:** 700.000 € **Implementation:** Hellenic Center for Renewable Energy Sources (CRES)

Project description:

• **Promotion of the use of RES in households, decrease of energy consumption, protection of the environment and strengthening of the national/local economy.**

• **Enhancement of business and scientific co-operation between Greece and Lebanon in the sector of RES Technologies.**

Technology transferred: Solar systems and energy saving lighting equipment for household use in affected regions of South Lebanon, supply and installation of testing and measurement equipment for solar collectors, aiming at the creation of a permanent centre for solar testing.

Project title: Renewable Energy Sources – Development and Implementation of Solar Energy

Recipient country: Armenia

Total funding: 360.000 €

Implementation: Hellenic Center for Renewable Energy Sources (CRES)

Project description:

• Development of a new solar market and cooperation in the sector of RES and EE with Armenia.

• Promotion of the use of RES in Public Buildings, decrease of energy consumption, protection of the environment and strengthening of the national/local economy.

Technology transferred: combi solar thermal systems

Project title: Action Plan for Cooperation in the Field of Renewable Energy Sources

Recipient country: Turkey

Total funding: 456.666 €

Implementation: Hellenic Center for Renewable Energy Sources (CRES)

Project description:

• Development of co-operation in the fields of Solar Energy and other Renewable Energy Sources with Turkey

• Support to the harmonisation of the Turkish Legal Framework of RES to the E.U *acquis*

Technology transferred: Installation of solar & energy savings systems

Project title: Installation of solar systems for household use in poor households in the region of Monaragala

Recipient country: Sri Lanka

Total funding: 290.000 €

Implementation: Athens Network of Collaborating Experts (ACNE)

Project description:

Facilitate/finance access to electricity supply through solar systems, for poor, agrarian families for which electricity supply through conventional technologies is not possible

Technology transferred: solar systems for household use

Project title: MeetMed - Mitigation Enabling Energy Transition in the Mediterranean Region

Recipient Country: South Eastern Mediterranean Countries (Algeria, Bosnia and Herzegovina, Egypt, France, Greece, Italy, Jordan, Lebanon, Libya, Morocco, Palestine, Portugal and Tunisia)

Targeted area: climate change mitigation

Sector: Energy

Source of funding: EU (85%) – Greece (15%)

Years of implementation: 2018-2020

Implementation: Hellenic Center for Renewable Energy Sources (CRES)

Project description:

The Mitigation Enabling Energy Transition in the Mediterranean region (meetMED) project is a two-years EU-funded project, developed by the Mediterranean Association of the National Agencies for Energy Management (MEDENER) and the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) to support regional cooperation and build technical capacity for energy transition in Southern and Eastern Mediterranean (SEM) countries. meetMED has been officially launched in May 2018 at the headquarters of the Union for the Mediterranean (UfM) in Barcelona, Spain. Its main goal is to foster energy transition in the SEM countries, by enhancing the share of Renewable Energy Sources (RES) and Energy Efficiency (EE) in their energy mix. The meetMED secretariat is coordinating the implementation of the project, which articulates in four workstreams: 1) assessing EE and RES strategies and policies; 2) advancing vocational training and public awareness; 3) attracting sustainable investments in RES and EE; 4) supporting the UfM Renewable Energy and Energy Efficiency Platform.

Technology transferred:

Energy efficiency and renewable energy technologies

Project title: EU Technical Assistance Facility for the "Sustainable Energy for All" Initiative (SE4All) - Western and Central Africa

Recipient Country: Western and Central Africa

Targeted area: climate change mitigation

Sector: energy

Source of funding: EU

Implementation: Hellenic Center for Renewable Energy Sources (CRES)

Project description:

The general objective is to support the targeted developing countries to improve their policy and regulatory framework conditions aiming at providing attractive and enabling conditions for increased public and private investment in energy access, energy supplies, renewable energy and energy efficiency.

Technology transferred:

Energy efficiency and renewable energy technologies

Project title: EU Technical Assistance Facility for the "Sustainable Energy for All" Initiative (SE4All) - Eastern and South Africa

Recipient Country: Eastern and South Africa

Targeted area: climate change mitigation

Sector: energy

Source of funding: EU

Implementation: Hellenic Center for Renewable Energy Sources (CRES)

Project description:

The general objective is to support the targeted developing countries to improve their policy and regulatory framework conditions aiming at providing attractive and enabling conditions for increased public and private investment in energy access, energy supplies, renewable energy and energy efficiency.

Technology transferred:

Energy efficiency and renewable energy technologies