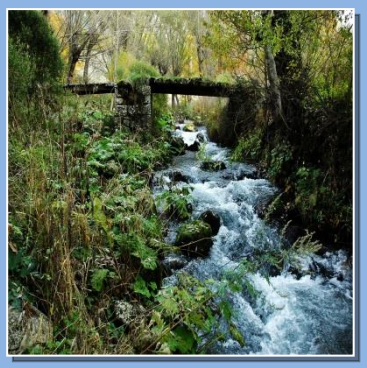
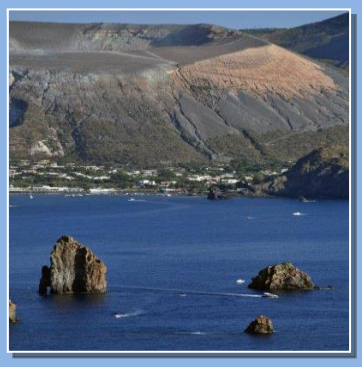
MINISTRY FOR THE ENVIRONMENT LAND AND SEA




# Fourth Biennial Report

# Italy




December 2019

# Italy

# Fourth Biennial Report

**December 2019**

# 1. Introduction

This document is the fourth Biennial Report (BR) of Italy under decision 2/CP.17 of the Conference of the Parties under the UNFCCC.

As defined in the UNFCCC biennial reporting guidelines for developed country Parties[1], the information is structured into:

- Information on greenhouse gases (GHG) emissions and trends and the GHG inventory including information on Italian national inventory arrangements (section 2);
- Quantified economy wide emission reduction target (section 3);
- Progress in achievement of the quantified economy-wide emission reduction targets (section 4);
- Projections (section 5) and
- Provision of financial, technological and capacity building support to developing countries (section 6, 7).

Tabular information as defined in the common tabular format (CTF) for the UNFCCC biennial reporting guidelines for developed country Parties (UNFCCC decision 19/CP.18) are enclosed in the report and have been officially submitted to the UNFCCC secretariat. For the CTF submission, the electronic reporting facility provided by the UNFCCC Secretariat has been used as required by UNFCCC decision 19/CP.18.

[1] Annex I to UNFCCC decision 2/CP.17

## 2. Information on GHG emissions and trends[2]

### *2.1 Summary information on greenhouse gas emissions and trends*

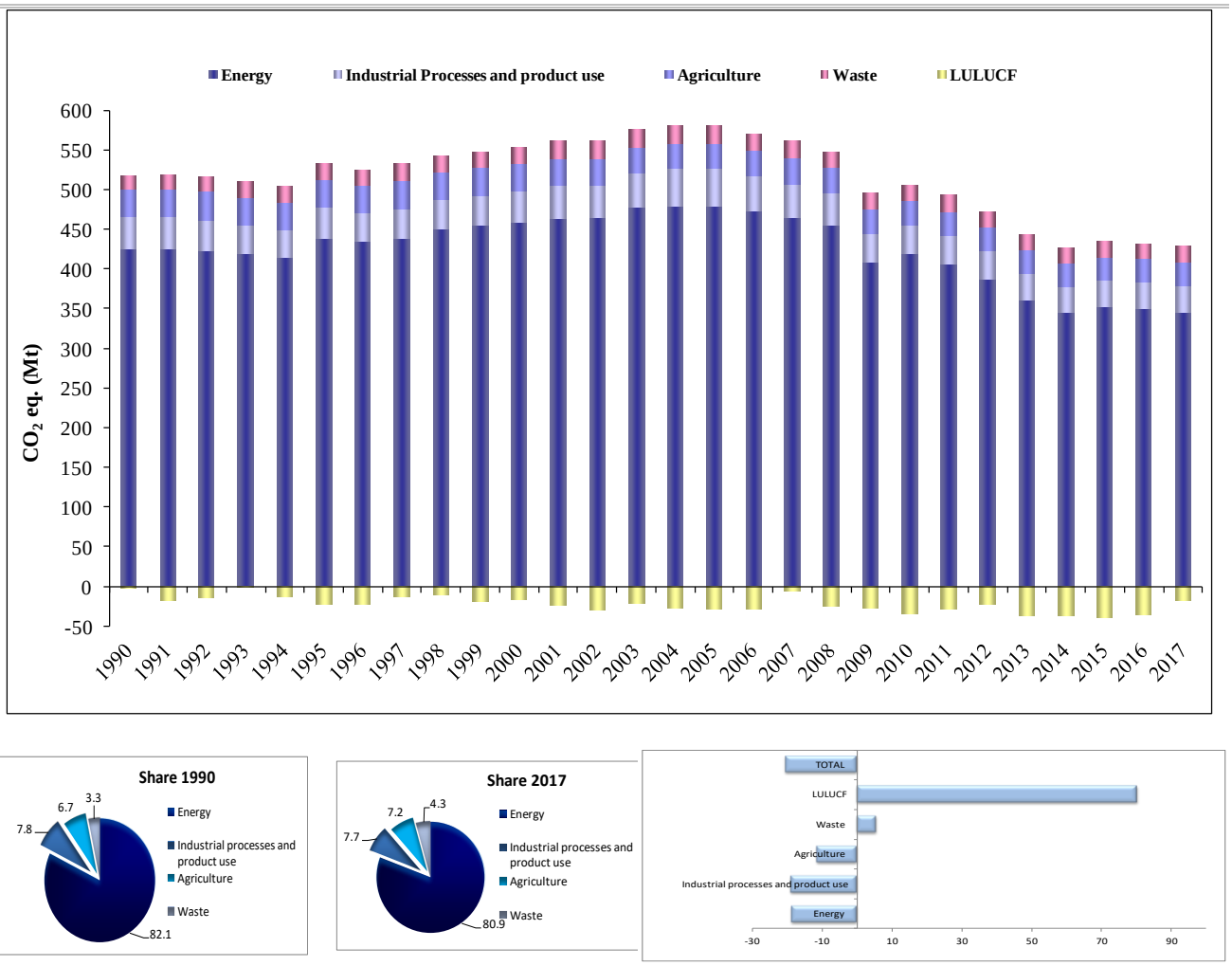
Italy's total greenhouse gas emissions, excluding emissions and removals from land use, land use change and forestry (LULUCF) decreased by 17.4% between 1990 and 2017, from 518 million tons (Mt) of $CO_2$-equivalent to 428 Mt of $CO_2$-equivalent in 1990.

The share of the different sectors, in terms of total emissions, remains nearly unvaried over the period 1990-2017. The energy sector is the largest contributor to national total GHG emissions with a share, in 2017, of 80.9%, followed by industrial processes and product use and agriculture, accounting for 7.7% and 7.2%, respectively, of total emissions, and waste contributing with 4.3%.

Considering total GHG emissions with emissions and removals from LULUCF, the energy sector accounts, in 2017, for 77.5% of total emissions and removals, as absolute weight, followed by, industrial processes and product use sector and agriculture (7.4% and 6.9%, respectively), LULUCF which contributes with 4.1%, and waste (4.1%).

Figure 1 illustrates the national trend of greenhouse gases for 1990-2017, expressed in $CO_2$-equivalent terms and by sector.

**Figure 1: Trend of total GHG emissions (1990-2017) (Gg $CO_2$ eq.)**




[2] Author: Daniela Romano

The most important greenhouse gas, $CO_2$, which accounted for 81.6% of total emissions in $CO_2$ equivalent in 2017, showed a decrease by 20.6% between 1990 and 2017.

In the energy sector, in particular, $CO_2$ emissions, in 2017, are 18.5% lower than in 1990. $CH_4$ and $N_2O$ emissions were equal to 10.3% and 4.2%, respectively, of the total $CO_2$ equivalent greenhouse gas emissions in 2017. $CH_4$ levels have decreased by 9.1% from 1990 to 2017, while $N_2O$ has decreased by 31.8%. As for the other greenhouse gases, HFCs account for 3.6% of total emissions, PFCs and $SF_6$ are equal to 0.3% and 0.1% of total emissions, respectively; the weight of $NF_3$ is about 0.01%.

It should be noted that, from 2008, the economic recession has had a remarkable influence on the production levels affecting the energy and industrial process sectors, but on the other hand, an increase of the use of renewable sources (hydro and wind) and advance in energy efficiency was also observed.

As for $CO_2$, emissions in the 1990s essentially mirrored energy consumption. A decoupling between the curves is observed only in recent years, mainly because of the substitution of fuels with high carbon contents by methane gas in the production of electric energy and in industry; in the last years, the increase in the use of renewable sources has led to a notable reduction of $CO_2$ intensity.

The relevant sectors in terms of emissions are energy production and transport, contributing to about half of total national levels. For the transport sector, GHG emissions show a decrease in 2017, with respect to 1990, equal to -2.7%. After a peak in 2007, due to an increase in goods and passengers movements, emissions from the transport sector show a decrease (-23.2% from 2007 to 2017) mainly explained by the economic crisis contributing to the reduction of movements and by the penetration in the market of low energy consumption vehicles.

Emissions from energy industries show a reduction of 23.6% in 2017 with respect to 1990, in spite of an increase in the thermoelectric energy production (from 178.6 TWh to 209.5 TWh) and electric energy consumption (from 218.7 TWh to 291.0 TWh).

The time series of electricity production clearly shows that although the specific carbon content of the kWh generated in Italy has constantly improved over the years, total $CO_2$ emissions have raised till 2006 due to the even bigger increase of electricity production. The decreasing trend, from 2006, results from an increase in energy production from renewable sources, combined with a further reduction in the use of oil products for electricity production. In the last years, the decrease is even more accentuated because of the economic recession. Specifically, in 2015, an increase in fuel consumption and CO2 emissions is observed as a consequence of the increase of national energy demand which has been fulfilled by an increase of energy production in the natural gas fuelled plants because of a reduction of energy production from Hydroelectric plants.

In the period 1990-2017, emissions from energy consumption in the residential and commercial sector have increased by 5.6%. A shift from oil products to natural gas is observed along the time series. But it should be also noted that the use of natural gas for energy production and heating was already in place in the first nineties; so the increase of emission levels in the nineties is to be attributed to the increasing number of buildings and their heating systems, as well as the occurrence of singular annual climatic features, as observed in 2005 due to exceptionally cold weather conditions. $CH_4$ and $N_2O$ emissions also increase in the period, due to the growing use of woody biomass and biogas for heating and, in the agriculture sector, for heating and aquaculture plants.

Finally, for the manufacturing industry, emissions have decreased by 38.9% from 1990 to 2015. The decrease is driven by the shift from the use of fuel oil to natural gas for energy and heat production; in the last years, a further decrease is observed due to the reduction of industrial production levels.

For the industrial processes and product use sector, emissions decreased by 18.9% in 2017 with respect to 1990. The trend is mainly driven by the sharp reduction of $N_2O$ emissions from the chemical industry (-90.4%) due to the installation of abatement technologies in adipic and nitric acid production plants and, in the last years, of $CO_2$ from mineral products for the economic recession, and in particular for the decrease of cement production. On the other side, a notable increase of F-gas emissions, is observed

especially for the use of HFCs in refrigeration and air conditioning systems, together with their use in pharmaceutical aerosol.

In the agriculture sector, emissions have decreased by 11.4% from 1990 to 2017. The main reduction is observed in emissions from enteric fermentation (-8.2%) and manure management (-25.4%) because of a reduction in animal population, specifically cattle and dairy cattle; the reduction is also due to a less extensive use of fertilisers affecting the emissions from agricultural soils (-16.8%). In addition, in the last years, the recovery of biogas from manure management to be used for energy purposes has become a relevant practice.

Finally, emissions from the waste sector have increased by 5.5% between 1990 and 2017. The trend is mainly driven by the increase in emissions from solid waste disposal (11.8%); in fact, in spite of the decrease of the solid waste disposed of on land as a consequence of waste management policies and the increase in the methane-recovered percentage, emissions are also influenced by the composition of the waste and site conditions. This increase is counterbalanced by the decrease of emissions from wastewater treatment (-15.3%) due to a reduction in wastewater production in some industrial sectors.

Considering total GHG emissions with emissions and removals from LULUCF, emission and removals levels show a decrease of 20.4% from 1990 to 2017. The energy sector accounts, in 2017, for 77.5% of total emissions and removals, as absolute weight, followed by, industrial processes and product use and agriculture (7.4% and 6.9, respectively), LULUCF which contributes with 4.1%, and waste (4.1%). Total removals, in $CO_2$ equivalent, in the LULUCF sector, show a high variability in the period, with $CO_2$ accounting for 91.2% of the sector. The key driver for the rise in removals is the increase of carbon stock changes from forest land (the area reported under forest land remaining forest land has increased by 24.0%); but it should be noted that the trend is remarkable influenced by the annual area burned by fires

Further information on greenhouse emissions and trend is detailed in chapter 2 of the National Inventory Report 2019, Italian Greenhouse Gas Inventory 1990-2017.

### *2.2 National inventory arrangements*

The Legislative Decree 51 of March 7$^{th}$ 2008 instituted the National System for the Italian Greenhouse Gas Inventory, following the requirements set in the article 5.1 of the Kyoto Protocol and in according to the Decision n°280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol. The last one has been replaced in 2013 by the regulation n°525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change. As indicated by art. 14 bis of the Legislative Decree, the Institute for Environmental Protection and Research (ISPRA), former Agency for Environmental Protection and Technical Services (APAT) is the single entity in charge of the preparation and compilation of the national greenhouse gas emission inventory. The Ministry for the Environment, Land and Sea is responsible for the endorsement of the inventory and for the communication to the Secretariat of the Framework Convention on Climate Change and the Kyoto Protocol.

The 'National Registry for Carbon sinks', instituted by a Ministerial Decree on 1st April 2008, is part of the Italian National System and includes information on units of lands subject of activities under Article 3.3 and activities elected under Article 3.4 and related carbon stock changes. In agreement with the Ministerial decree art.4, the Ministry for the Environment, Land and Sea is responsible for the management of the National Registry for Carbon sinks. The Decree also provides that ISPRA and the State Forestry Corps are involved by the Ministry as technical scientific support for specific activities as defined in the relevant protocol. ISPRA is responsible for the preparation of emission and removals estimates for the LULUCF sector and for KP LULUCF supplementary information under art.7.1 of the Kyoto Protocol. Following an update of the abovementioned Ministerial Decree, in 2013, the Institute for

Services on Agricultural and Agro-food Market (ISMEA[3]) has been designated for the technical coordination of the section related to cropland and grazing land management of the National Registry of Carbon Sinks.

The National Registry for Carbon sinks is the instrument to estimate, following the COP/MOP decisions and in accordance with the IPCC guidelines, the greenhouse gases emissions by sources and removals by sinks in the land subject to art.3.3 and art.3.4 activities of the Kyoto Protocol and to account for the net removals in order to allow the Italian Registry to issue the corresponding amount of RMUs.

Moreover, in the context of the Kyoto Protocol commitments and its amendment ('Doha amendment') for the second Commitment Period (2013-2020), Italy adopted, in 2016, the Law N. 79/2016, "Ratification of the Doha amendment to the Kyoto Protocol", which establishes, according to article 12 of 525/2013/EU (the Monitoring Mechanism Regulation), the National system for policies, measures and emissions projections. ISPRA is also responsible of this system and, in cooperation with IMELS, collects all the information and data from the competent Ministries. Article 1 of the Decree implementing law N. 79 (9 December 2016), reports the list of information and data that are to be sent by the competent ministries to IMELS and ISPRA and the timing for providing such information. With the establishment of this system, there has been a strengthening of roles and obligations for statistical data flow, some of which are useful for the inventory scope.

ISPRA is the national entity with overall responsibility for the national inventory of Italy, including the Kyoto protocol obligations.

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The Institute prepares annually a document that describes the national system including all updated information on institutional, legal and procedural arrangements for estimating emissions and removals of greenhouse gases and for reporting and archiving inventory information. The reports are publicly available at http://www.sinanet.isprambiente.it/it/sia-ispra/serie-storiche-emissioni.

The Italian National System, currently in place, is fully described in the document *National Greenhouse Gas Inventory System in Italy*[4].

Since the Seventh National Communication and the Third Biennial Report no changes have occurred in the national inventory arrangements.

[3] ISMEA is a public body, providing support to public and private sector. According to DPR 31 March 2001, n. 200, ISMEA is part of the National Statistical System – SISTAN and of the National Agricultural Information System – SIAN.
[4] ISPRA, 2018. National Greenhouse Gas Inventory System in Italy. Year 2018.
http://www.sinanet.isprambiente.it/it/sia-ispra/serie-storiche-emissioni

## CTF Table 1 Greenhouse Gas Emissions (kt $CO_2$ eq)

| ***Greenhouse gas emissions*** | ***1990*** | ***1995*** | ***2000*** | ***2005*** | ***2010*** | ***2015*** | ***2016*** | ***2017*** | ***Change from 1990 to latest reported year*** |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ***kt $CO_2$ eq*** | | | | | ***%*** |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | 439,640 | 451,433 | 470,294 | 494,458 | 426,351 | 355,785 | 353,487 | 348,991 | -20.6 |
| $CO_2$ emissions including net $CO_2$ from LULUCF | 434,050 | 428,341 | 452,453 | 465,108 | 390,908 | 315,558 | 316,117 | 328,643 | -24.3 |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | 48,263 | 50,361 | 50,765 | 48,299 | 46,919 | 43,801 | 43,577 | 43,852 | -9.1 |
| $CH_4$ emissions including $CH_4$ from LULUCF | 49,746 | 50,707 | 51,698 | 48,659 | 47,276 | 44,091 | 43,973 | 45,333 | -8.9 |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | 26,084 | 27,430 | 28,445 | 27,788 | 18,826 | 17,547 | 17,944 | 17,796 | -31.8 |
| $N_2O$ emissions including $N_2O$ from LULUCF | 26,907 | 28,258 | 29,123 | 28,401 | 19,238 | 17,875 | 18,360 | 18,285 | -32.0 |
| HFCs | 444 | 927 | 2,477 | 7,512 | 11,724 | 14,703 | 15,045 | 15,294 | 3,344.6 |
| PFCs | 2,907 | 1,492 | 1,488 | 1,940 | 1,520 | 1,688 | 1,614 | 1,314 | -54.8 |
| Unspecified mix of HFCs and PFCs | NA,NO | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 100.0 |
| $SF_6$ | 408 | 680 | 604 | 550 | 394 | 472 | 399 | 417 | 2.2 |
| $NF_3$ | NA,NO | 77 | 13 | 33 | 20 | 28 | 34 | 23 | 100.0 |
| **Total (excluding LULUCF)** | **517,746** | **532,419** | **554,106** | **580,600** | **505,773** | **434,044** | **432,119** | **427,708** | **-17.4** |
| **Total (including LULUCF)** | **514,462** | **510,500** | **537,877** | **552,223** | **471,099** | **394,436** | **395,561** | **409,329** | **-20.4** |

## CTF Table 1 Greenhouse Gas Source and Sink Categories (kt $CO_2$ eq)

| ***Greenhouse gas source and sink categories*** | ***1990*** | ***1995*** | ***2000*** | ***2005*** | ***2010*** | ***2015*** | ***2016*** | ***2017*** | ***Change 1990-2017*** |
|---|---|---|---|---|---|---|---|---|---|
| | | | ***kt $CO_2$ eq*** | | | | | | ***%*** |
| 1. Energy | 425,233 | 439,358 | 459,095 | 479,675 | 418,615 | 352,832 | 350,284 | 345,852 | -18.7 |
| 2. Industrial Processes and Product Use | 40,472 | 38,368 | 39,178 | 47,152 | 36,748 | 32,576 | 32,556 | 32,827 | -18.9 |
| 3. Agriculture | 34,739 | 34,701 | 33,946 | 31,893 | 30,012 | 30,065 | 31,000 | 30,780 | -11.4 |
| 4. Land Use, Land-Use Change and Forestry[b] | -3,283 | -21,919 | -16,229 | -28,377 | -34,674 | -39,608 | -36,558 | -18,379 | 459.7 |
| 5. Waste | 17,302 | 19,993 | 21,887 | 21,880 | 20,399 | 18,571 | 18,278 | 18,249 | 5.5 |
| 6. Other | NO | NO | NO | NO | NO | NO | NO | NO | 0.0 |
| **Total (including LULUCF)** | **514,462** | **510,500** | **537,877** | **552,223** | **471,099** | **394,436** | **395,561** | **409,329** | **-20.4** |

## CTF Table 1 $CO_2$ Source and Sink Categories (kt)

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | kt | | | | % |
| **1. Energy** | **409,279** | **423,126** | **443,657** | **464,938** | **404,040** | **340,243** | **338,082** | **333,436** | **-18.53** |
| A. Fuel combustion (sectoral approach) | 405,266 | 419,156 | 440,421 | 462,401 | 401,417 | 337,669 | 335,599 | 331,085 | -18.30 |
| 1. Energy industries | 136,447 | 140,989 | 148,817 | 156,823 | 136,048 | 105,199 | 103,784 | 104,215 | -23.62 |
| 2. Manufacturing industries and construction | 91,713 | 90,001 | 90,762 | 86,130 | 60,383 | 49,920 | 51,167 | 50,120 | -45.35 |
| 3. Transport | 100,313 | 111,503 | 121,401 | 126,555 | 113,953 | 104,855 | 102,002 | 98,391 | -1.92 |
| 4. Other sectors | 75,721 | 75,167 | 78,604 | 91,660 | 90,381 | 77,236 | 78,130 | 78,032 | 3.05 |
| 5. Other | 1,071 | 1,496 | 837 | 1,233 | 652 | 459 | 515 | 326 | -69.57 |
| B. Fugitive emissions from fuels | 4,014 | 3,971 | 3,236 | 2,537 | 2,622 | 2,574 | 2,483 | 2,351 | -41.42 |
| 1. Solid fuels | 0.4 | 0.1 | 0.3 | 0.3 | 0.3 | 0.2 | NO,NA | NO,NA | |
| 2. Oil and natural gas and other emissions from energy production | 4,013 | 3,970 | 3,236 | 2,537 | 2,622 | 2,574 | 2,483 | 2,351 | -41.41 |
| C. $CO_2$ transport and storage | NO | NO | NO | NO | NO | NO | NO | NO | |
| **2. Industrial Processes and Product Use** | **29,385** | **27,338** | **25,904** | **28,772** | **21,786** | **15,009** | **14,768** | **15,024** | **-48.87** |
| A. Mineral industry | 20,720 | 20,240 | 20,749 | 23,305 | 17,379 | 11,218 | 10,613 | 10,816 | -47.80 |
| B. Chemical industry | 2,577 | 1,632 | 1,421 | 1,697 | 1,434 | 1,256 | 1,463 | 1,473 | -42.84 |
| C. Metal industry | 4,378 | 3,903 | 2,302 | 2,419 | 1,834 | 1,563 | 1,710 | 1,675 | -61.74 |
| D. Non-energy products from | 1,709 | 1,564 | 1,432 | 1,350 | 1,139 | 972 | 981 | 1,059 | -38.03 |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | kt | | | | % |
| fuels and solvent use | | | | | | | | | |
| E. Electronic industry | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | NO | NO | |
| H. Other | NA | NA | NA | NA | NA | NA | NA | NA | |
| **3. Agriculture** | **466** | **513** | **527** | **521** | **353** | **438** | **539** | **436** | **-6.5** |
| A. Enteric fermentation | | | | | | | | | |
| B. Manure management | | | | | | | | | |
| C. Rice cultivation | | | | | | | | | |
| D. Agricultural soils | | | | | | | | | |
| E. Prescribed burning of savannas | | | | | | | | | |
| F. Field burning of agricultural residues | | | | | | | | | |
| G. Liming | 1 | 1 | 2 | 14 | 18 | 14 | 12 | 17 | 1,189.5 |
| H. Urea application | 465 | 519 | 525 | 507 | 335 | 425 | 527 | 418 | -10.0 |
| I. Other carbon-containing fertilizers | NO | NO | NO | NO | NO | NO | NO | NO | |
| J. Other | NO | NO | NO | NO | NO | NO | NO | NO | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | kt | | | | % |
| **4. Land Use, Land-Use Change and Forestry** | **-5,590** | **-23,093** | **-17,841** | **-29,350** | **-35,443** | **-40,226** | **-37,370** | **-20,349** | **264.0** |
| A. Forest land | -17,852 | -31,122 | -26,004 | -34,662 | -36,658 | -40,113 | -37,072 | -22,734 | 27.4 |
| B. Cropland | 2,172 | 1,785 | 2,014 | 1,429 | 1,305 | 2,157 | 1,099 | 1,228 | -43.4 |
| C. Grassland | 3,993 | -1,237 | 131 | -2,881 | -4,494 | -7,061 | -6,743 | -3,938 | -198.6 |
| D. Wetlands | NE,NO | 5 | 8 | 8 | 130 | 130 | 79 | 79 | 100.0 |
| E. Settlements | 6,639 | 8,272 | 6,491 | 7,287 | 4,394 | 4,438 | 5,176 | 5,178 | -22.0 |
| F. Other land | NO | NO | NO | NO | NO | NO | NO | NO | |
| G. Harvested wood products | -543 | -796 | -480 | -531 | -121 | 223 | 91 | -162 | -70.2 |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **5. Waste** | **510** | **455** | **205** | **227** | **172** | **94** | **98** | **96** | **-81.1** |
| A. Solid waste disposal | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | NO,NA | |
| B. Biological treatment of solid waste | | | | | | | | | |
| C. Incineration and open burning of waste | 510 | 455 | 205 | 227 | 172 | 94 | 98 | 96 | -81.1 |
| D. Waste water treatment and discharge | | | | | | | | | |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **6. Other (as specified in the summary table in CRF)** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | kt | | | | % |
| **Memo items:** | | | | | | | | | |
| **International bunkers** | **8,739** | **9,886** | **12,102** | **15,307** | **15,721** | **15,103** | **16,992** | **18,279** | **109.2** |
| Aviation | 4,285 | 5,799 | 7,955 | 8,489 | 8,816 | 9,573 | 10,301 | 11,166 | 160.6 |
| Navigation | 4,454 | 4,087 | 4,147 | 6,818 | 6,905 | 5,530 | 6,690 | 7,113 | 59.7 |
| **Multilateral operations** | **NE** | **NE** | **NE** | **NE** | **NE** | **NE** | **NE** | **NE** | |
| **$CO_2$ emissions from biomass** | **14,177** | **17,021** | **19,214** | **24,361** | **42,898** | **45,990** | **46,756** | **48,610** | **242.9** |
| **$CO_2$ captured** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | |
| **Long-term storage of C in waste disposal sites** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | |
| **Indirect $N_2O$** | | | | | | | | | |
| **Indirect $CO_2$ (3)** | NO | NO | NO | NO | NO | NO | NO | NO | |
| **Total $CO_2$ equivalent emissions without LULUCF** | **439,640** | **451,433** | **470,294** | **494,458** | **426,351** | **355,785** | **353,487** | **348,991** | **-20.6** |
| **Total $CO_2$ equivalent emissions with LULUCF** | **434,050** | **428,341** | **452,453** | **465,108** | **390,908** | **315,558** | **316,117** | **328,643** | **-24.3** |
| **Total $CO_2$ equivalent emissions, including indirect $CO_2$, without LULUCF** | **NA** | **NA** | **NA** | **NA** | **NA** | **NA** | **NA** | **NA** | |
| **Total $CO_2$ equivalent emissions, including indirect $CO_2$, with LULUCF** | **NA** | **NA** | **NA** | **NA** | **NA** | **NA** | **NA** | **NA** | |

## CTF Table 1 $CH_4$ Source and Sink Categories (kt)

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| **1. Energy** | **454** | **436** | **403** | **366** | **374** | **319** | **307** | **314** | **-30.8** |
| A. Fuel combustion (sectoral approach) | 100 | 111 | 101 | 92 | 126 | 121 | 118 | 124 | 24.9 |
| 1. Energy industries | 9 | 8 | 7 | 6 | 5 | 5 | 5 | 5 | -43.3 |
| 2. Manufacturing industries and construction | 7 | 7 | 6 | 6 | 5 | 11 | 11 | 11 | 63.3 |
| 3. Transport | 38 | 43 | 33 | 21 | 13 | 10 | 9 | 8 | -77.8 |
| 4. Other sectors | 46 | 52 | 55 | 59 | 103 | 95 | 92 | 100 | 118.6 |
| 5. Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -77.5 |
| B. Fugitive emissions from fuels | 354 | 326 | 303 | 273 | 248 | 199 | 189 | 189 | -46.5 |
| 1. Solid fuels | 5 | 3 | 4 | 4 | 3 | 2 | 2 | 1 | -72.2 |
| 2. Oil and natural gas and other emissions from energy production | 349 | 323 | 299 | 269 | 244 | 197 | 187 | 188 | -46.1 |
| C. $CO_2$ transport and storage | | | | | | | | | |
| **2. Industrial Processes and Product Use** | **5** | **5** | **3** | **3** | **2** | **2** | **2** | **2** | **-65.6** |
| A. Mineral industry | | | | | | | | | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| B. Chemical industry | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | -93.2 |
| C. Metal industry | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | -40.7 |
| D. Non-energy products from fuels and solvent use | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | NO,NA | |
| E. Electronic industry | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | |
| G. Other product manufacture and use | NO | NO | NO | NO | NO | NO | NO | NO | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **3. Agriculture** | **853** | **844** | **819** | **767** | **766** | **767** | **783** | **788** | **-7.6** |
| A. Enteric fermentation | 620 | 613 | 602 | 548 | 541 | 548 | 562 | 569 | -8.2 |
| B. Manure management | 157 | 151 | 150 | 148 | 151 | 152 | 152 | 152 | -3.3 |
| C. Rice cultivation | 75 | 80 | 66 | 70 | 73 | 67 | 69 | 66 | -12.5 |
| D. Agricultural soils | NE | NE | NE | NE | NE | NE | NE | NE | 0.0 |
| E. Prescribed burning of savannas | NO | NO | NO | NO | NO | NO | NO | NO | 0.0 |
| F. Field burning of agricultural residues | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.4 |
| G. Liming | | | | | | | | | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| H. Urea application | | | | | | | | | |
| I. Other carbon-containing fertilizers | | | | | | | | | |
| J. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **4. Land Use, Land-Use Change and Forestry** | **59** | **14** | **37** | **14** | **14** | **12** | **16** | **59** | **-0.1** |
| A. Forest land | 32 | 7 | 21 | 5 | 5 | 8 | 11 | 48 | 52.0 |
| B. Cropland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49.5 |
| C. Grassland | 27 | 7 | 16 | 10 | 9 | 4 | 5 | 11 | -60.7 |
| D. Wetlands | NO | NO | NO | NO | NO | NO | NO | NO | |
| E. Settlements | NO | NO | NO | NO | NO | NO | NO | NO | |
| F. Other land | NO | NO | NO | NO | NO | NO | NO | NO | |
| G. Harvested wood products | | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **5. Waste** | **619** | **729** | **806** | **796** | **734** | 664 | 652 | 651 | 5.2 |
| A. Solid waste disposal | 488 | 605 | 688 | 680 | 622 | 559 | 545 | 546 | 11.8 |
| B. Biological treatment of solid waste | 0 | 0 | 2 | 4 | 5 | 5 | 5 | 5 | 2480.6 |
| C. Incineration and open burning of waste | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 12.5 |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| D. Waste water treatment and discharge | 128 | 121 | 114 | 110 | 105 | 98 | 99 | 98 | -23.7 |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **6. Other (as specified in the summary table in CRF)** | NO | NO | NO | NO | NO | NO | NO | NO | |
| **Total $CH_4$ emissions without $CH_4$ from LULUCF** | **1,931** | **2,014** | **2,031** | **1,932** | **1,877** | **1,752** | **1,743** | **1,754** | **-9.1** |
| **Total $CH_4$ emissions with $CH_4$ from LULUCF** | **1,990** | **2,028** | **2,068** | **1,946** | **1,891** | **1,764** | **1,759** | **1,813** | **-8.9** |
| **Memo items:** | | | | | | | | | |
| **International bunkers** | **0.4** | **0.4** | **0.4** | **0.7** | **0.7** | **0.6** | **0.7** | **0.7** | **68.8** |
| Aviation | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 240.1 |
| Navigation | 0.4 | 0.4 | 0.4 | 0.6 | 0.7 | 0.5 | 0.6 | 0.7 | 59.7 |
| **Multilateral operations** | NE | NE | NE | NE | NE | NE | NE | NE | |
| **$CO_2$ emissions from biomass** | | | | | | | | | |
| **$CO_2$ captured** | | | | | | | | | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | kt | | | | % |
| **Long-term storage of C in waste disposal sites** | | | | | | | | | |
| **Indirect $N_2O$** | | | | | | | | | |
| **Indirect $CO_2$ (3)** | | | | | | | | | |

## CTF Table 1 $N_2O$ Source and Sink Categories (kt)

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| **1. Energy** | **15** | **18** | **18** | **19** | **18** | **15** | **15** | **15** | **-0.8** |
| A. Fuel combustion (sectoral approach) | 15 | 18 | 18 | 19 | 17 | 15 | 15 | 15 | -0.8 |
| 1. Energy industries | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | -12.3 |
| 2. Manufacturing industries and construction | 5 | 4 | 4 | 5 | 4 | 3 | 2 | 2 | -45.9 |
| 3. Transport | 3 | 6 | 5 | 5 | 3 | 3 | 3 | 3 | -7.3 |
| 4. Other sectors | 6 | 6 | 7 | 7 | 9 | 8 | 8 | 8 | 44.1 |
| 5. Other | 0.2 | 0.2 | 0.1 | 0.3 | 0.1 | 0.06 | 0.05 | 0.04 | -81.1 |
| B. Fugitive emissions from fuels | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | -18.6 |
| 1. Solid fuels | NA | NA | NA | NA | NA | NA | NA | NA | 0.0 |
| 2. Oil and natural gas and other emissions from energy production | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | -18.6 |
| C. $CO_2$ transport and storage | | | | | | | | | |
| **2. Industrial Processes and Product Use** | **24** | **26** | **29** | **28** | **4** | **2** | **2** | **2** | **-90.4** |
| A. Mineral industry | | | | | | | | | |
| B. Chemical industry | 22 | 23 | 26 | 25 | 2 | 0.5 | 0.4 | 0.5 | -97.8 |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| C. Metal industry | NA | NA | NA | NO | NO | NO | NO | NO | |
| D. Non-energy products from fuels and solvent use | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | NO,NA | |
| E. Electronic industry | | | | | | | | | |
| F. Product uses as ODS substitutes | | | | | | | | | |
| G. Other product manufacture and use | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | -29.2 |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | 0.00 |
| **3. Agriculture** | **43** | **44** | **43** | **41** | **35** | **35** | **37** | **36** | **-17.8** |
| A. Enteric fermentation | | | | | | | | | |
| B. Manure management | 10 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | -21.0 |
| C. Rice cultivation | | | | | | | | | |
| D. Agricultural soils | 34 | 35 | 35 | 33 | 27 | 27 | 29 | 28 | -16.8 |
| E. Prescribed burning of savannas | NO | NO | NO | NO | NO | NO | NO | NO | 0.00 |
| F. Field burning of agricultural residues | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 4.3 |
| G. Liming | | | | | | | | | |
| H. Urea application | | | | | | | | | |
| I. Other carbon- | | | | | | | | | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| containing fertilizers | | | | | | | | | |
| J. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **4. Land Use, Land-Use Change and Forestry** | **3** | **3** | **2** | **2** | **1** | **1** | **1** | **1** | **-40.6** |
| A. Forest land | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 52.0 |
| B. Cropland | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | -63.1 |
| C. Grassland | 0.9 | 0.2 | 0.5 | 0.2 | 0.3 | 0.1 | 0.1 | 0.3 | -60.7 |
| D. Wetlands | NO | NO | NO | NO | NO | NO | NO | NO | |
| E. Settlements | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | -28.3 |
| F. Other land | NO | NO | NO | NO | NO | NO | NO | NO | |
| G. Harvested wood products | | | | | | | | | |
| H. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **5. Waste** | **4** | **4** | **5** | **6** | **6** | **6** | **6** | **6** | **42.21** |
| A. Solid waste disposal | | | | | | | | | |
| B. Biological treatment of solid waste | 0.1 | 0.2 | 0.7 | 1 | 2 | 2 | 2 | 2 | 2,472.6 |
| C. Incineration and open burning of waste | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | -48.0 |
| D. Waste water treatment and discharge | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 5.8 |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | kt | | | | | % |
| E. Other | NO | NO | NO | NO | NO | NO | NO | NO | |
| **6. Other (as specified in the summary table in CRF)** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | |
| **Total direct $N_2O$ emissions without $N_2O$ from LULUCF** | **88** | **92** | **95** | **93** | **63** | **59** | **60** | **60** | **-31.8** |
| **Total direct $N_2O$ emissions with $N_2O$ from LULUCF** | **90** | **95** | **98** | **95** | **65** | **60** | **62** | **61** | **-32.0** |
| **Memo items:** | | | | | | | | | |
| **International bunkers** | **0.2** | **0.3** | **0.3** | **0.4** | **0.4** | **0.4** | **0.4** | **0.5** | **96.9** |
| Aviation | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 131.6 |
| Navigation | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 59.7 |
| **Multilateral operations** | NE | NE | NE | NE | NE | NE | NE | NE | |
| **$CO_2$ emissions from biomass** | | | | | | | | | |
| **$CO_2$ captured** | | | | | | | | | |
| **Long-term storage of C in waste disposal sites** | | | | | | | | | |
| **Indirect $N_2O$** | **10** | **9** | **7** | **6** | **5** | **4** | **4** | **4** | **-64.4** |
| **Indirect $CO_2$ (3)** | | | | | | | | | |

## CTF Table 1 Emissions of HFCs, PFCs, SF6, NF3 (kt CO2 eq)

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 % |
|---|---|---|---|---|---|---|---|---|---|
| **Emissions of HFCs and PFCs - (kt $CO_2$ eq.)** | **3,351** | **2,438** | **3,985** | **9,471** | **13,264** | **16,411** | **16,678** | **16,627** | **396.2** |
| **Emissions of HFCs - (kt $CO_2$ eq.)** | **444** | **927** | **2,477** | **7,512** | **11,724** | **14,703** | **15,045** | **15,294** | **3,344.6** |
| HFC-23 | 0.03 | 0.03 | 0.01 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | -6.4 |
| HFC-32 | NA,NO | NO,NA | 0.00 | 0.14 | 0.25 | 0.35 | 0.39 | 0.43 | 100 |
| HFC-41 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-43-10mee | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-125 | NO,NA | 0.01 | 0.09 | 0.53 | 0.94 | 1.26 | 1.32 | 1.37 | 100 |
| HFC-134 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-134a | NO,NA | 0.26 | 1.03 | 1.88 | 2.25 | 2.47 | 2.49 | 2.49 | 100 |
| HFC-143 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-143a | NO,NA | 0.01 | 0.10 | 0.44 | 0.77 | 1.01 | 1.02 | 1.03 | 100 |
| HFC-152 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-152a | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-161 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-227ea | NO,NA | 0.00 | 0.04 | 0.16 | 0.30 | 0.39 | 0.40 | 0.41 | 100 |
| HFC-236cb | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 % |
|---|---|---|---|---|---|---|---|---|---|
| HFC-236ea | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-236fa | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-245ca | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| HFC-245fa | NA,NO | NA,NO | NA,NO | 0.14 | 0.23 | 0.30 | 0.30 | 0.30 | 100 |
| HFC-365mfc | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| Unspecified mix of HFCs - (kt $CO_2$ eq.) | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| **Emissions of PFCs - (kt $CO_2$ eq.)** | **2,907** | **1,492** | **1,488** | **1,940** | **1,520** | **1,688** | **1,614** | **1,314** | **-54.8** |
| $CF_4$ | 0.32 | 0.18 | 0.18 | 0.24 | 0.20 | 0.22 | 0.21 | 0.17 | -45.7 |
| $C_2F_6$ | 0.05 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | -96.2 |
| $C_3F_8$ | NA,NO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 100 |
| $C_4F_{10}$ | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| c-$C_4F_8$ | NA,NO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 100 |
| $C_5F_{12}$ | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| $C_6F_{14}$ | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| C10F18 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| c-C3F6 | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NO,NA | NO,NA | NO,NA | |
| Unspecified mix of PFCs - (kt $CO_2$ eq.) | NA,NO | NO, NA | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | NA,NO | |

| Greenhouse gas source and sink categories | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | Change 1990-2017 % |
|---|---|---|---|---|---|---|---|---|---|
| **Unspecified mix of HFCs and PFCs - (kt $CO_2$ eq.)** | **NA,NO** | **19.6** | **19.6** | **19.6** | **19.6** | **19.6** | **19.6** | **19.6** | **100** |
| **Emissions of $SF_6$ - (Gg $CO_2$ eq.)** | **408** | **680** | **604** | **550** | **394** | **472** | **399** | **417** | **2.2** |
| $SF_6$ | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 2.2 |
| **Emissions of $NF_3$ - (kt $CO_2$ eq.)** | **NA,NO** | **77** | **13** | **33** | **20** | **28** | **34** | **23** | **100** |
| $NF_3$ | NA,NO | 0.004 | 0.001 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 100 |

# 3. Quantified Economy-wide Emission Reduction Target (QEERT)[5]

## *3.1 Italy's quantified economy-wide emission reduction target*

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20% compared to 1990 levels. This is documented in the UNFCCC document FCCC/SB/2011/INF.1/Rev.1 of 7 June 2011. In the EU submission to the UNFCCC from 20 March 2012 (FCCC/AWGLCA/2012/MISC.1) the EU target is further explained. As this target under the convention has only been submitted by EU-28 and not by each of its Member States (MS), there are no specified convention targets for single MS. Due to this, Italy as part of the EU-28, takes on a quantified economy-wide emission reduction target jointly with all Member States.

**CTF Table 2 (a) Description of quantified economy-wide emission reduction target: base year**

| **Party** | **Italy** | |
|---|---|---|
| Base year /base period | 1990 | |
| Emission reduction target | % of base year/base period | % of 1990<br>20.00 |
| Period for reaching target | BY-2020 | |

With the 2020 climate and energy package the EU has set internal rules which underpin the implementation of the target under the Convention. The 2020 climate and energy package introduced a clear approach to achieving the 20% reduction of total GHG emissions from 1990 levels. This reduction objective is divided between two sub-targets, equivalent to a split of the reduction effort between ETS and non-ETS sectors.

Legally binding target trajectories for the period 2013-2020 are enshrined in both the EU-ETS Directive (Directive 2003/87/EC and respective amendments) and the Effort Sharing Decision (Decision No 406/2009/EC). These legally binding trajectories not only result in a 20% GHG reduction in 2020 compared to 1990 but also define the national annual target pathway to reduce EU GHG emissions from 2013 to 2020. The Effort Sharing Decision sets annual national emission targets for all Member States for the period 2013-2020 for those sectors not covered by the EU emissions trading system (ETS), expressed as percentage changes from 2005 levels. In March 2013, the EU Commission formally adopted the national annual limits throughout the period for each Member State. By 2020, the national targets will collectively deliver a reduction of around 10% in total EU emissions from the sectors covered compared with 2005 levels. The emission reduction to be achieved from the sectors covered by the EU ETS will be 21% below 2005 emission levels. Starting from 2012 aviation is in the scope of the EU-ETS: in principle, the EU ETS should cover CO2 emissions of all flights arriving at, and departing from, airports in all EU Member States, Norway, Iceland and Liechtenstein and closely related territories. However, since 2012, flights to and from aerodromes from other countries have not been included in the EU ETS.

In Table 2(b) gases and sectors covered for the emission reduction are reported; the target covers the gases $CO_2$, $CH_4$, $N_2O$, HFCs, PFCs and $SF_6$. The global warming potential values considered are those reported in the 4thAR of the IPCC as adopted in the UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation (see Table 2(c)).

The EU Convention pledge does not include emissions/removals from Land Use, Land-Use Change and Forestry, but it is estimated, for Italy, to be a net sink over the relevant period. The emission inventory also includes information on emissions and removals from LULUCF in accordance with relevant reporting

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commitments under the UNFCCC. Accounting for LULUCF activities only takes place under the Kyoto Protocol.

### CTF Table 2(b) Description of quantified economy-wide emission reduction target: gases and sectors covered

| Gases covered | | Base year for each gas (year): |
|---|---|---|
| $CO_2$ | | 1990 |
| $CH_4$ | | 1990 |
| $N_2O$ | | 1990 |
| HFCs | | 1990 |
| PFCs | | 1990 |
| $SF_6$ | | 1990 |
| $NF_3$ | | |
| Other Gases (specify) | | |
| Sectors covered | Energy | Yes |
| | Transport[b] | Yes |
| | Industrial processes[c] | Yes |
| | Agriculture | Yes |
| | LULUCF | No |
| | Waste | Yes |
| | Other Sectors (specify) | |

*Notes*

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

a Still to be decided.

b Transport is reported as a subsector of the energy sector.

c Industrial processes refer to the industrial processes and solvent and other product use sectors.

### CTF Table 2(c) Description of quantified economy-wide emission reduction target: global warming potential values (GWP)

| Gases | GWP values |
|---|---|
| $CO_2$ | 4th AR |
| $CH_4$ | 4th AR |
| $N_2O$ | 4th AR |
| HFCs | 4th AR |
| PFCs | 4th AR |
| $SF_6$ | 4th AR |
| $NF_3$ | 4th AR |
| Other Gases (specify) | |

*Notes*

Abbreviations: GWP = global warming potential

### CTF Table 2(d) – Description of quantified economy-wide emission reduction target: approach to counting emissions and removals from the LULUCF sector

| **Role of LULUCF** | LULUCF in base year level and target | Excluded |
|---|---|---|
| | Contribution of LULUCF is calculated using | |

The Climate and Energy Package allows Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) to be used for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. In addition, the legislation foresees the possible recognition of units from new market mechanisms. Under the EU ETS the limit is up to 50% of the required reduction below 2005 levels. In the sectors not covered by the ETS, annual use shall not exceed to 3% of each Member States' non-ETS greenhouse gas emissions in 2005. A limited number of Member States, including Italy, may use an additional 1%, from projects in LDCs or SIDS subject to conditions. The use of these units under the ETS Directive and the Effort Sharing Decision is subject to the limits specified above which do not separate between CERs and ERUs, but include additional criteria for the use of CERs.

The assigned amount of Italy for the second commitment period has been determined and amount to 2,410,291,421 t $CO_2$eq. The EU expects to achieve its 20% target for the period 2013-2020 with the implementation of the ETS Directive and the ESD Decision for the non-ETS sectors, which do not allow the use of AAUs from non-EU Parties. Italy does not plan to acquire AAUs for compliance purpose to achieve its target and will not use international market-based mechanisms to achieve its emission reduction target under the Convention so according to the review process the relevant CTF Tables 2(e)I and 2(e)II have not been compiled.

The time-period of the Convention target is from 1990-2020. There are general provisions in place in the EU legislation that allow for the use of units from other mechanisms under the convention, provided that the necessary legal arrangements for the creation of such units have been put in place in the EU, which is not the case at the point in time of the provision of this report.

In December 2009, the European Council reiterated the conditional offer of the EU to move to a 30% reduction by 2020 compared to 1990 levels as part of a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.

Regarding other marked –based mechanisms there are general provisions in place in the EU legislation that allow for the use of such units. The necessary legal arrangements for the creation of such units have been put in place in the EU, which is not the case at the point in time of the provision of this report.

**CTF Table 2(e)I Description of quantified economy-wide emission reduction target: market-based mechanisms under the Convention**

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

**CTF Table 2(e)II Description of quantified economy-wide emission reduction target: other market-based Mechanisms**

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

# 4. Progress in achievement of QEERT[6]

## *4.1 National decision-making process related to climate change policies*

The Ministry of the Environment, Land and Sea (IMELS) is responsible for elaborating the national plan for GHG emissions reduction to be proposed for adoption to the Inter-Ministerial Committee for Economic Planning - CIPE.

The financial support and legislative instruments to implement the plan are identified through the Financial Law and are allocated to the central and local bodies on the basis of the respective competences.

Law N. 79/2016, the Ratification of the Doha amendment to the Kyoto Protocol", establishes under its article 5 and according to article 12 of 525/2013/EU (the Monitoring Mechanism Regulation), the National system for policies, measures and emissions projections. The National Institute for Environmental Protection and Research (ISPRA) is responsible of the system and, in cooperation with IMELS, collects all the information and data from the competent Ministries. Article 1 of the Decree implementing law N. 79 (9th December 2016), reports the list of information and data that are to be sent by the competent ministries to IMELS and ISPRA and the timing for providing such information.

## *4.2 Monitoring and evaluation of progress with climate policies and measures*

According with law No 79 (article 6), IMELS ensures the collection of information related to GHG emissions and other information concerning climate changes. IMELS also updates the document on the state of implementation of commitments to reduce GHG emissions, through an annex to the Financial Law.

The monitoring and evaluation of progress on policies and measures to cut greenhouse emissions are also reported in the documents submitted, every two year; by Member States to the European Commision under the Monitoring Mechanism Regulation[7].

Moreover, the Manager for Energy Services (GSE) sends to the European Commission the "Progress Report under Art. 22 of the 2009/28/EU Directive") every two years, where an ex post assessments of the most relevant national measures related to renewable energy use and energy efficiency are reported. The document is available at the following address: https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports[8].

## *4.3 Action taken and planned to achieve Italy's QEERT*

Pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, Italy has recently submitted to the European Commission the first draft integrated national energy and climate plan. The draft plan is the result of a common effort of the Ministry of Economic Development, the Ministry of Environment, Land and Sea and the Ministry of Transport and Infrastructures and it is largely based on data and information provided by ISPRA (linked to the Ministry of Environment), GSE, a State-owned company which promotes and supports renewable energy sources and energy efficiency and RSE, a company owned by GSE focused on research on energy production, distribution and consumption. The draft has been finalized in December 2018, but the analytical process has started in 2016 under the Head of Government Office.
During 2019, the draft national plan has been submitted to an extensive public consultation and it will also undergo a Strategic environmental assessment (SEA) that will help refining data, targets and policies and measures. Moreover, in April 2019 Italy has also submitted the national air pollution control program

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[7] https://www.eea.europa.eu/policy-documents/monitoring-mechanism-regulation-525-2013

[8] In the 2015 submission, please find the folder "Member State progress reports translated into English" and then, inside the folder, the file "Report 2015 Italy-EN".

under the new National Emissions Ceilings Directive (2016/2284/EU). This program has also been submitted to public consultation and SEA. The Italian government strongly support deep coherence between the plan and the program in order to pursue more effectively both climate change and air pollution mitigation. This report is based on the draft national plan provided in December, but, due to the processes that are in place, policies and measures emission as well projections are likely to be updated in the beginning of 2020.
This section gives a description of the main policies and measures that have had or are expected to have a direct or indirect effect on the reduction of greenhouse gas emissions in Italy.
The potential emissions reduction has been assessed up to 2030. The policies and measures hereinafter described are divided into two types:

- Measures implemented by 31st December 2016;
- Measures planned. The measures envisaged as planned are consistent with the ones reported in the draft National Energy and Climate plan, however the impact assessment is not yet available for all policies and measures but only a sectoral level. Some planned measures have been reported in more than one sector; the effect assessed in terms of greenhouse gas emissions reduction is the one expected in the specific sector.

The list of policies and measures has been revised with respect to the BR3 submission due to the work done for the preparation of the first draft integrated national energy and climate plan.

### *4.4 EU policies*

The 8th and 9th March 2007 conclusion of the European Council named "Integrated Energy and Climate Change Package" (IECCP) committed the European Member States to achieve by 2020 the following targets:

- 20% reduction of EU GHG emissions compared to 1990. This reduction could be raised to 30% with a global agreement for the period post 2012.
- 20% reduction in energy use to be achieved by improving energy efficiency.
- 20% use of renewable energy
- 10% use of biofuels in the transport sector.

This comprehensive set of legislation acts, also known as the 'Climate and Energy package' or "20/20/20 package", was agreed at EU level to reach those objectives and is being implemented. The most relevant European legislation acts are:

- *Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing directive 2001/77/EC and 2003/30/EC:* this Directive also subdivides the 20% renewable target between the EU Member States. According to that, by 2020 the 17% of the national final energy consumption of Italy should come from renewable sources.
- *Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the community*: this Directive revises and strengthens the EU Emissions Trading Scheme (EU ETS) already in place since 2005, which commits to an overall EU reduction of 21% of emissions compared to 2005 levels from the industrial sector.
- *Decision n. 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (ESD*): by 2020 Italy shall reduce the GHG emissions by 13% *compared to 2005 levels, in all the sectors not covered by the EU ETS, such as transport, civil, agriculture and waste sectors.*
- *Directive 2012/27/EC of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC:* 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.

On the 12th December 2015, UNFCCC Decision 1/CP.21 adopted the Paris Agreement, a new international agreement aimed at reducing GHG emissions with a view of *"holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change"* (Article 2.a, Paris Agreement).

Decision 1/CP.21 also welcomes the submission of Intended Nationally Determined Contributions (INDCs). The European Union submitted an INDC committing its Member States to reduce its overall GHG emissions by at least 40% by 2030, compared to 1990 levels. The EU INDC, which was translated into a NDC following the ratification and entry into force of the Paris Agreement, is in line with the so called "2030 EU Climate and Energy Framework" [9] defined in October 2014. The new Framework contains the following binding targets to be reached by 2030:

- at least 40% reduction in GHG emissions compared to 1990 (-43% and -30% by 2030, compared to 2005 levels, for EU ETS sectors and ESD sectors, respectively);
- at least 27% of energy consumption from renewable sources (EU Directive 2018/2001 improved the EU target to 32%);
- at least 27% of energy efficiency improvements (EU Directive 2018/2002 improved the EU target to 32,5%)

To monitor progress and assess compliance towards the targets starting from year 2013 national emissions and projections have been divided in two main sectors: EU ETS and all other sectors (non-ETS):

- ETS sector: Its application started with a first 'pilot' phase as of 2005 to 2007, the so called first period. For the second period, 2008-2012, the EU single wide cap is determined according to a linear reduction path arriving at a reduction of 21% below reported 2005 emissions in 2020. The starting point of such path is the mid-point of the 2008-12 period, while the starting level is the average annual total quantity of allowances issued by Member States pursuant to Commission Decisions on Member States' national allocation plans. This path set implies a decrease of the EU wide cap of 1.74% annually. For the third trading period (2013-2020) the ETS reduction is applied uniformly throughout the EU with a declining EU wide emissions cap which decreases annually by 2.2% up to 2030. Operators subject to ETS will acquire the emission allowances on the market, through dedicated auctions , an assessment of emissions of operators subject to ETS at national. level will be possible ex post. The legislative act implementing such a revision is expected to be agreed by the end of 2017.
- Non ETS sector: Italy is committed to reduce its greenhouse gas emissions in the non ETS sector of 13% by 2020 with respect to 2005 level under "Decision n. 406/2009/EC of the European Parliament and of the Council of 23th April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020", the so-called "Effort Sharing Decision" (ESD). On the 20th July 2016 the European Commission presented an Effort Sharing Regulation, as a follow-up of the previous EU Effort Sharing Decision (ESD): under the ESR proposal Italy is assigned a 33% emission reduction target in non-ETS sectors to be achieved by 2030 compared to 2005 levels. The legislative act is now in the last phase of negotiation between the EU institutions. The emissions from LULUCF sector are excluded from the accounting.

### *4.5 Cross Sectoral policies*

***National Action Plan for Renewable Energy 2010 and Legislative decree 28/2011***

In January 2007, the Commission published a Renewable Energy Roadmap outlining a long-term strategy and in 2009 the EU adopted Directive 2009/28/EC aiming at increasing the average renewable share across the EU to 20% by 2020. The directive sets mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy: the national target for Italy is 17%. EU countries are free to decide their own preferred 'mix' of renewable sources, allowing them to take

[9] https://ec.europa.eu/clima/policies/strategies/2030_en

account of their different potentials. They had to present National Action Plans (NAPs) based on indicative trajectories to the European Commission by 30 June 2010, followed by progress reports to be submitted every two years. The objective, expressed as share of energy from renewable sources relative to total consumption in transport, electricity and heating and cooling in 2020, also takes into account the effects of other policy measures addressing energy efficiency.
The Directive 2009/28/EU has been transposed by the Legislative Decree N. 28 of 3rd March 2011. The decree defines the mechanisms, the incentives and the institutional, financial and legal tools necessary to achieve the 2020 targets regarding the renewable energy use. The decree also provides for a substantial reorganization of existing incentive schemes, in particular in the field of green certificates and white certificates system.

***The White Certificates system***

The White Certificates or Energy Efficiency Titles (EETs) system represents a cross cutting policy aimed at promoting energy efficiency and delivering emissions reductions in end-use energy sectors: industrial, residential, service. A Ministerial Decree firstly introduced the system on 24th April 2001.

The decree defined criteria, conditions and procedures to implement energy efficiency measures in end-use energy sectors. In December 2012, the so called "White Certificate Decree" was issued. The new (?) decree defines the criteria, the conditions and the procedures to implement energy efficiency measures in end-use energy. The Decree has also transferred, from 2013, competences concerning the management, assessment and certification of energy saving projects carried out under white certificates system to a State owned company (Gestore dei Servizi Energetici – GSE).

The certification of energy savings produced by each project is made via the issue of Energy Efficiency Titles (EETs) where one EET is equivalent to one Mtoe.

The eligible projects are: re-phasing of electric systems, electric motors and their applications, lighting systems, reduction of electricity leaking, switching from electricity to other fuels when this produces primary energy savings, reduction of electricity consumption for heating purposes, reduction of electricity consumption for air conditioning, high efficient electric appliances, high efficient office equipment, switching from other fuels to electricity when this produces primary energy savings, reduction of primary energy consumption in industrial processes, reduction of primary energy consumption for heating, ventilation and air conditioning system, promotion of end-use technologies fuelled by renewable sources, electric and gas-fuelled vehicles, information campaigns to raise awareness and promote energy savings.

### *4.6 Policies in the Energy industries sector*

***Renewable Energy Sources***

In Italy, the electricity production by renewable use has registered a sizeable increase in the period 2010-2018, growing from about 77 to 107 GWh.

The growth was driven by the financial incentives in the form of feed-in-tariffs named Conto Energia, in particular for photovoltaic production. The incentive for photovoltaic production has now been greatly reduced and increase in production is now much lower. Feed-in-tariffs are still operative for new biogas production.
In addition, thermal renewable sources have a relevant role in achieving the Integrated Energy and Climate Change Package (IECCP) targets. Heat final consumption represents the largest share of Italian energy consumption in the civil and industrial sectors (approximately 50% of total final consumption). Thermal renewable sources are generally more efficient and less expensive than the electric ones, either in terms of cost per tonne of $CO_2$ avoided or cost per kWh of final energy produced.
The most relevant measures implemented and planned in the renewable energy sources are reported below:

- The "Conto Energia" – Feed-in scheme: has been regulated since 2005 by five Ministerial Decrees, the last being the Ministerial Decree of 5 July 2012 (Fifth Feed-in Scheme), which

entered into force on 27 August 2012. The "Conto Energia" is a support system that provides constant reward for electricity produced by solar photovoltaic and thermodynamic, for a fixed period (20 years for photovoltaic systems, solar systems and 25 years for thermodynamic) through a tariff for all energy produced by the plants (feed in premium). The system has exhausted the available financial allowances in mid-2013.

- The Green Certificates system: were tradable certificates, issued by GSE proportionate to the energy generated by a renewable energy sources power plant, and in a quantity, which varies according to the type of renewable source and type of project (construction, reactivation, upgrading or renovation). Such scheme started since 2002 with the Legislative Decree 79/1999. The scheme was based on the legal obligation for producers and importers of electricity from non-renewable sources to inject each year into the national electricity system a minimum quota of electricity from renewable sources. Possession of Green Certificates served as proof of compliance with this obligation: each Green Certificate certifies conventionally the generation of 1 MWh of renewable energy. Green Certificates were issued for a period of 15 years. After one decade in operation, the Green Certificate system was replaced in 2013 by the new incentive scheme introduced by the Ministerial Decree of 6 July 2012. Consequently, in the last years the share of obligation has decreased progressively in accordance with Legislative Decree No 28/2011 transposition of Directive 2009/28/EU.
- The All-Inclusive Feed-in tariff: is a support system based on granting a fixed charge to renewable energy installations depending on the electricity provided to the grid(feed in tariff). This rate is applicable only to facilities of less than 1 MW (200 kW for wind) of power and includes both an incentive (differentiated by technology) and the remuneration for the energy fed into the grid. The rate is all-encompassing and is recognized for a variable period depending by technology. This system has been replaced by the Ministerial Decree of 6 July 2012.
- Ministerial Decree of 6th July 2012: through this Ministerial Decree changes were made to the incentives for electrical renewable energy (excluding photovoltaic).The incentives are granted on the net generation of electricity fed into the grid by the plant; thus, self-consumed electricity does not benefit from the incentives. Two separate incentive mechanisms are available based on the plant's type, installed capacity and renewable source : an all-inclusive feed-in tariff for plants with power capacity of up to 1 MW and an incentive for plants with installed capacity of more than 1 MW and for those with capacity of up to 1 MW which do not opt for the all-inclusive tariff.
- Ministerial Decree of 23rd June 2016: this Decree updates the mechanisms introduced by the Ministerial Decree 6 July 2012 for the promotion of electricity production from plants feed by renewable sources other than photovoltaic, including also thermodynamic solar plants. The plants are incentivized on the basis of the energy fed into the network: those up to 500 kW with all-inclusive tariffs. Depending on the power of the plants, access to incentives is subject to the registration of plants in registers or participation in competitive auctions, while in the case of smaller plants access is direct.

***Exemption from charges for self-consumption in small plants***

Support the self-consumption of the electricity produced by single and multiple (renweable energy communities) small installations through the reduction of system and network costs. Additional self-consumption support tools will be:

- strengthening the minimum requirements for renewable sources in new buildings or buildings subject to deep renovations, in line with the objectives of Nzero buildings.

- Progressive and gradual extension of the minimum requirement for renewable sources to existing buildings, starting from some categories such as warehouses used for productive activities and the tertiary buildings.

***Improvement of the obligation to integrate renewables in new buildings***

Annex 3 of Legislative Decree n.28 of 2011, transposing the RES Directive, identifies obligations to integrate renewable sources in new buildings or buildings subject to major renovations,.

The obligations are currently established in terms of shares (increasing over the years) of coverage with renewable sources of the energy needs of the building for the supply of heating, cooling and domestic hot water services.

In particular, it is envisaged that in case of new buildings or buildings subjected to major renovations, renewable thermal energy production must reach at least 50% of the foreseen consumption needed for domestic hot water and, at the same time, the following percentages referred to the sum of the consumptions foreseen for domestic hot water, heating and cooling:

- 20% when the request for the construction permit is presented from 31 May 2012 to 31 December 2013;

- 35% when the request for the construction permit is presented from 1 January 2014 to 31 December 2016;

- 50% when the request for the construction permit is issued from 1 January 2017 (then extended to 2018).

### ***Incentives to electrical and thermal renewables in the small islands***

Italy has already started a process to have higher renewable penetration in small islands upgrading their electricity network, in particular to support the realization of pilot projects, aimed at a high use of renewable sources through accumulation systems, development of electric transport, integration of the electricity system with the island's water system.

### ***Power Purchase Agreement (PPA)***

Stipulation by investors of Power Purchase Agreement (PPA) with interested parties to purchase the energy that the plant will produce over a sufficiently long time interval to guarantee the amortization of the investment necessary for the realization of a new production plant, or to rebuild or upgrade an existing plant.

### ***Coal phase out***

Italy has planned to ban coal use for electricity production from 2025. This measure will be implemented taking into account an adequate capacity replacement, the development of the electricity grid and the high penetration of renewable sources.

### ***Cogeneration and District Heating***

Cogeneration is currently supported by incentive schemes, rewarding both the production of heat and the production of electricity. In particular, all cogeneration plants benefit from the White Certificate system while cogeneration from renewable energy sources are additionally entitled to receive incentive to reward the green electricity produced. In this sector, Italy already has a historically high use in the industrial sector, with many existing plants from medium to large size.

In the field of high-efficiency cogeneration, in accordance with the provisions of the new directive on energy efficiency, further measures of a regulatory nature will be introduced in addition to the incentive scheme in force, in order to facilitate this technology that has significant potential of primary energy savings. Public support can point to the development of new facilities, in particular of small dimensions, but especially should aim to the revamping of existing installations, structures and technologies towards higher-yielding processes.

The heating demand in the residential sector has been the most relevant factor for the development of district heating; however, it is still possible to exploit an increase in thermal energy distributed through district heating networks, equal to approximately 30%. In order to develop this potential, it will be essential to adapt and strengthen the tools available today to encourage the new construction and expansion of the urban heating infrastructure. This measure is considered as planned.

**Table 4.1- Summary of policies in the Energy industries sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Electricity production by renewable use | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Subsidied and Support system for renewable electricity production | | Ministry of economic development | 8,600.00 | NE |
| Conto Energia | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 25000 MW at 2020 | 2010 | Ministry of economic development | IE | NE |
| Green Certificate and "Omnicomprensiva" Tariff | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Subsidied and Support system for renewable electricity production different from photovoltaic plants | 2009 | Ministry of economic development | IE | NE |
| White certificates - Cogeneration - mechanism with upgrading | Yes | Energy | CO2 | Efficiency improvement in the energy and transformation sector | Economic | Implemented | Supporting CHP and district heating plants | 2015 | GSE - Energy Services Operator | 1,210.00 | NE |
| Energy production and transformation | No | Energy | CO2 | Increase in renewable energy | Regulatory, Economic, Other (Planning) | Planned | Promotion and support to the renewable energy sources | 2020 | ARERA - Italian Regulatory Authority for Electricity Gas and Water, Ministry of Economic Development, Ministry for the environment, Land and Sea Protection, Regions, GSE - Energy Services Operator | NE | 24,600.00 |
| Exemption from charges for self-consumption in small plants | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Support the self-consumption of the electricity produced by single and multiple (renweable energy communities) small installations throguh the reduction of system and | 2020 | ARERA - Italian Regulatory Authority for Electricity Gas and Water | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affecte d | Objective and/or activity affected | Type of instrument | Status of implementatio n | Brief description | Start year of implementatio n | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | network costs | | | | |
| Promotion of Power Purchase Agreement (PPAs) for renewable energy plants | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Update the present regulation and set up new regulatory and technical reference to help penetration of PPA with no additional costs for public fincance or citizens | 2020 | Ministry of Economic Development | NE | IE |
| Incentives for large renewable source plants through competitive procedures aimed at the most mature technologies | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Payment of the difference between tariff and market price of electricity where the difference is positive; refund by the producer if the difference is negative | 2020 | Ministry of Economic Development | NE | IE |
| Support for large renewable energy plants with innovative technologies that are not competitive yet | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Definition of specific tariffs for innovative production technologies and, where possible, support to investments and research&development | 2020 | Ministry of Economic Development | NE | IE |
| Aggregation of small plants to facilitate the access to incentives | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Aggregation of small installations will have access to competitive procedures as large renewable source plants | 2020 | Ministry of Economic Development | NE | IE |
| Concertation with local authorities for the identification of suitable areas for the installation of renewable energy plants | No | Energy | CO2 | Increase in renewable energy | Other (Planning) | Planned | Government will set up a database of built-up areas suitable for PV installations. Region and local competent authorities will identify non built-up areas were renewable plants, storage systems and network appliances can be installed with simplified procedures | 2020 | Ministry of Economic Development , Ministry for the environment, Land and Sea Protection, Regions, Municipalities | NE | IE |
| Revamping/repowering and optimization of existing plants | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Simplification of authorizations and procedures for revamping / repowering of existing plants | 2020 | Ministry of Economic Development | NE | IE |
| Support for the installation of distributed storage | No | Energy | CO2 | Increase in renewable | Economic | Planned | Current rules on storage will be amended and a new regulatory framework | 2020 | Ministry of Economic Development | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| systems | | | | energy | | | will be established | | | | |
| Self-consumers and renewable energy communities | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Simplification of permit procedures for self-consumers and renewable energy communities in order to address, through a single procedure, permitting, network connection and access to support mechanisms | 2020 | Ministry of Economic Development | NE | IE |
| Revision of the regulations for the allocation of hydroelectric concessions | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | The auction procedures for the existing concessions will be integrated in the territorial planning, considering other uses of water, on the basis of homogeneous rules at national level, also in terms of fees. Procedures will transparently privilege the redevelopment of the plants, in order to ensure the useful storage capacity and increase the producibility, in compliance with environmental constraints. | 2020 | Ministry of Economic Development | NE | IE |
| Coal phase-out | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Planned to ban coal use for electricty production from 2025 | 2020 | Ministry of Economic Development | NE | IE |
| Renewables in existing buildings | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Extension and improvement of the obligation to integrate renewables into existing buildings | 2020 | Ministry of Economic Development | NE | IE |
| Renewables in new buildings | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Improvement of the obligation to integrate renewables in new buildings | 2020 | Ministry of Economic Development | NE | IE |
| Incentives to electrical and thermal renewables use in the small islands | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Electricity network upgrade to have higher renewable penetration. Pilot projects regarding renewable productions, storage systems, development of electrical | 2020 | GSE - Energy Services Operator | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affecte d | Objective and/or activity affected | Type of instrument | Status of implementatio n | Brief description | Start year of implementatio n | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | transport, integration of the electrical system with the water system | | | | |

### *4.7 Policies in the Manufacturing Industry and Construction sector*

***White Certificates***

Policies affecting $CO_2$ emissions in the industry sector are generally designed to improve industrial energy efficiency. The main instrument is represented by the White Certificates system, which is aimed at promoting energy efficiency and deliver emissions reductions in all the energy end-use sectors. The implementation of directive 2006/32/CE, on energy end use efficiency and energy services in the industrial sector, and the Action Plan 2007 impose new targets for White Certificates to 2016, and it is envisaged the extension of the scheme to 2030.

***Energy audits in companies***

This measure was actually in place from 2015, but it did not show great impacts on the sector; for this reason, it will be updated to increase its effectiveness, directing audits on companies and on sites where potential energy savings are more relevant. In the period 2021-2030, the program to support the elaboration of energy audits in large companies and energy-intensive activities will be further extended to energy-intensive companies in the gas sector and the fiscal benefit perceived by energy-intensive users will be linked to the implementation of energy efficiency interventions. Furthermore, action will be taken to promote energy efficiency in SMEs, renewing the co-financing initiatives for energy audits and energy management systems, for example by creating synergies with the support tools present at national and local level, supporting the energy efficiency training programs in collaboration with trade associations and setting the foundations for the promotion of voluntary agreements between companies that aim to promote energy efficiency.

***Impresa 4.0***

Impresa 4.0 is a plan that aims to stimulate companies (in particular micro, small and medium-sized enterprises and innovative start-ups) to invest in innovation through tax breaks and reductions. The plan main target is to encourage investments in new machineries and devices with high technological content.The assets eligible for tax reductions also include solutions strictly connected to energy efficiency, such as:

- components, systems and intelligent solutions for the management, efficient use and monitoring of energy and water consumption and for the reduction of emissions;

- software, systems, platforms and applications for plant intelligence that guarantee energy efficiency and decentralization mechanisms in which energy production and / or storage can also be delegated (at least partially) to the factory.

**Table 4.2- Summary of policies in the Manufacturing Industry and Construction sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| White certificates - Industry | Yes | Energy | CO2 | Efficiency improvement in industrial end-use sectors | Economic | Implemented | Supporting electric energy saving in the industry sector | 2009 | GSE - Energy Services Operator | 4,600.00 | NE |
| Energy efficiency, renwevables and electrification in the industrial sector | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Economic, Regulatory, Fiscal | Planned | Increase energy efficiency and renewable energy production in the industrial sector | 2020 | GSE- Energy Services Operator, ENEA - Italian National agency for new technologies, Energy and sustainable economic development, Ministry of Economic Development | NE | 5,000.00 |
| White certificates (Certificati bianchi) mechanism with upgrading | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Economic | Planned | Update and widen mechanism to support energy savings | 2020 | GSE- Energy Services Operator | NE | IE |
| Energy audits in companies | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Regulatory | Planned | Co-financing of energy audits in SMEs; adoption of energy management systems compliant with ISO 50001 standards; extension to energy-intensive businesses in the gas sector and correlation of the benefit to the execution of energy efficiency interventions | 2020 | ENEA - Italian National agency for new technologies, Energy and sustainable economic development. | NE | IE |
| National Industry 4.0 Plan (Impresa 4.0) | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Fiscal | Planned | Tax breaks and reductions to stimulate companies - micro, small and medium-sized enterprises and innovative startups - to invest in innovation. | 2020 | Ministry of Economic Development | NE | IE |

### *4.8 Policies in the Other sector (Residential and Tertiary) sector*

***Minimum energy performance requirements for buildings***

The directive 2002/91/CE on Energy Efficiency introduced stricter energy requirements and promoted the diffusion of renewable energy sources in the building sector. The directive also required the provision of energy performance certificates when buildings are constructed, sold or rented out. The directive has been transposed by legislative decree 102/2005 subsequently amended by legislative decree 311/2006 to strengthen buildings thermal demand requirements. The law could be applied to new and existing buildings subject to major renovation and provided for some important measures. Amongst the main provisions, the following obligations are worth mentioning:

- installation of technical blinds for solar protection and insulation of new buildings and buildings subject to overall renovation (limited to buildings over 1000 m2);
- laying down of all the necessary works to allow the connection of new buildings (and buildings subject to major renovation) to district heating systems, when existing (and not further than 1 km) or planned;
- installation of solar thermal systems that cover at least 50% of hot water demand for all new buildings and in case of replacement or renovation of the existing heating system;
- installation of PV systems (with a power capacity to be defined in a subsequent ministerial decree) in all new buildings and in existing buildings with a total floor area over 1000m2.

Subsequently, the Directive 2010/31/EC on the European Energy Performance of Buildings Directive (EPBD) (transposed into national law with the decree 63/2013) defines mandatory standards for new buildings. In particular, article 9 foresees that by 31 December 2020 all new buildings will be nearly zero-energy buildings and after 31 December 2018 new buildings occupied and owned by public authorities will be nearly zero-energy buildings. The transposition of this directive has raised the requirement on new buildings and mad it consistent in all regions.

***Tax deduction***

Tax deductions for energy renovation of buildings were introduced in Italy by the 2007 Finance Act and are still active. This is a voluntary mechanism, whereby individuals or businesses may deduct, respectively from their personal (IRPEF) or corporate (IRES) income tax, a percentage of the expenditure incurred for certain types of energy upgrading works on existing buildings. The deduction is staggered over 10 years. The eligible interventions are:

- reduction of energy needs for heating through global energy requalification and transformation into NZEB;

- improvement of the building's thermal insulation (replacement of windows including window coverings and insulation, vertical walls and floors);

- the installation of thermal solar panels;

- replacement of winter air-conditioning systems (with condensing boilers, heat pumps, hybrid systems, micro-cogenerators, biomass boilers);

- replacement of electric water heaters with heat pump water heaters;

- the installation of building automation devices and systems.

Solar thermal systems, high efficiency heat pumps, low-enthalpy geothermal systems and biomass heating systems can benefit from a support scheme for energy saving in the building sector via tax deductions.

To have access to the deduction it is necessary that the interventions are carried out on existing residential buildings (or parts of buildings).

An important contribution to energy efficiency in buildings will also come from the application of the Inter-ministerial Decree 26 June 2015 "Application of energy performance calculation methodologies and definition of minimum requirements and requirements for buildings" that envisages the construction of near-zero energy buildings starting from 2021.

### *Decree 28th December 2012 - Conto Termico ("Thermal Account")*

The 28th December 2012 decree, the so called "Conto Termico" decree, implements the incentive scheme introduced by Legislative Decree 28/2011; in particular, it encourages small-scale energy efficiency measures in public sector buildings and the production of thermal energy from renewable sources (in both public and private sector). The incentives are identified based on the energy saving achievable for the building and on energy production from renewable sources. The Thermal Account is in place since July 2013

At the beginning of 2016, the Thermal Account 2.0 has been introduced favoring greater access to resources for businesses, families and the Public Administration. In addition, it introduced significant elements to strengthen the incentive tool with the addition of new incentivable interventions.

The incentive mechanism is eligible for two types of subjects:

- Public administrations;
- private subjects, understood as persons, condominiums and subjects with business income or agricultural income.

The GSE is responsible for the implementation and management of the mechanism. It also provides for assignment, disbursement, withdrawal of incentives and verification of interventions.

### *National Fund for Energy Efficiency*

Legislative Decree no. 102/2014 has established the National Fund for energy efficiency. The Fund aims to support energy efficiency measures implemented by companies and the Public Administration on buildings, plants and production processes. The financed interventions are aimed at reducing energy consumption in industrial processes, building and expanding district heating networks and/or for district cooling, making public services and infrastructures more efficient, including public lighting, as well as for the energy upgrading of buildings. The management of the Fund is entrusted to Invitalia SpA (the National Agency for inward investment and economic development, owned by the Italian Ministry of Economy), based on a specific agreement with the Ministry of Economic Development and the Ministry of the Environment and the Protection of the Territory and the Sea.

### *Energy upgrading program for the Central Public Administration (PREPAC)*

The Interministerial Decree of 16 September 2016 has defined how to implement the Energy Requalification Program of the Central Public Administration (PREPAC), with a specific focus on identification and selection of interventions that can be admitted to financing and on needs of Pas in terms of information and technical assistance. In order to access the funding, the Public Administrations must develop proposals for intervention for the energy requalification of the buildings. The number of approved projects is equal to 69 in the period 2011-2015, 32 in 2016 and 39 in 2017. PREPAC program will continue in the period 2021-2030, taking into account the experience gained during the start-up phase of the mechanism.

### *Fondo Rotativo Kyoto – "Kyoto Rotation Fund"*

The "Fondo Rotativo di Kyoto" is a plan designed to promote public and private investment for energy efficiency in the building sector and in the industrial sector, and to promote small high-efficiency systems for the production of electricity, heating and cooling, use of renewable sources in small plants, as well as the sustainable forest management and the promotion of innovative technologies in the energy sector. The Fund provides long term lending at low interest rate: the loans reimbursed by the operator are reused in other projects.

**Table 4.3- Summary of policies in the Other sector (Residential and Tertiary) sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum energy performance requirements for buildings | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Regulatory | Implemented | Application of the minimum energy performance requirements for buildings. These requirements apply to public and private buildings, whether they are new buildings or existing buildings subject to restructuring | 2006 | Ministry of Economic Development | 3,610.00 | 4,000.00 |
| Energy efficiency in building | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Fiscal, Economic | Implemented | Measures of energy saving and energy efficiency in the civil sector | | Ministry of Finance and GSE - Energy Services Operator | 7,190.00 | NE |
| Tax deduction for energy saving in buildings | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Fiscal | Implemented | Supporting of energy saving in existing buildings through tax deduction of 65%, 55% or 36% based on the savings expected | 2008 | Ministry of Finance | IE | NE |
| Thermal account | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Economic | Implemented | Incentives for small-scale energy efficiency measures in buildings and production of thermal energy from renewable sources | 2012 | GSE - Energy Services Operator | IE | NE |
| Energy efficiency, renwevables and electrification in the civil sector | No | Energy | CO2 | Efficiency improvements of buildings , Increase in renewable energy , Demand management/reduction , Efficiency | Economic, Fiscal, Regulatory | Planned | Increase energy efficiency and renewable energy production and emission reduction in the civil sector | 2020 | GSE- Energy Services Operator, Ministry of economic development, Ministry of environment land and sea, Ministry of Finance | NE | 12,700.00 |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | improvement in services/ tertiary sector , Increase of consumption in thermal renewable energy sources | | | | | | | |
| White certificates (Certificati bianchi) mechanism with upgrading | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Update and widen mechanism to support energy savings | 2020 | GSE- Energy Services Operator | NE | IE |
| Thermal account (Conto termico) mechanism with upgrading | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Update of the incentive schemes for small-scale energy efficiency measures in buildings and production of thermal energy from renewable sources | 2020 | Ministry of economic development , Ministry of environment land and sea | NE | IE |
| Renewables in existing and new buildings | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Extension and improvement of the obligation to integrate renewables into existing and new buildings | 2020 | Ministry of economic development, Ministry of environment land and sea | NE | IE |
| National Fund for Energy Efficiency | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Granting of guarantees on individual financing operations and provision of subsidized loans | 2020 | Ministry of economic development , Ministry of environment land and sea | NE | IE |
| Incentives for the promotion of electrical and thermal renewables in the small islands | No | Energy | CO2 | Increase of consumption in thermal renewable energy sources | Economic | Planned | Electricity network upgrade to have higher renewable penetration. Pilot projects regarding renewable productions, storage systems, development of electrical transport, integration of the electrical system with the water system | 2020 | Ministry of economic development ,Ministry of environment land and sea | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy efficiency of residential buildings through tax deductions for building renovations and energy upgrading | No | Energy | CO2 | Efficiency improvements of buildings | Fiscal | Planned | Modulated benefit considering the expected savings on the entire technical life of the upgrade, in order to reward renovations with the best cost-effectiveness ratio and increase the propensity towards radical interventions on the building (deep renovation) and seismic improvement. | 2020 | Ministry of economic development , Ministry of environment land and sea, Ministry of Finance | NE | IE |
| Efficient public lighting system | No | Energy | CO2 | Demand management/reduction | Regulatory | Planned | Obligation to make public lighting system more efficient | 2020 | Ministry of economic development, Ministry of environment land and sea | NE | IE |
| Energy upgrading program for the Central Public Administration (PREPAC) | No | Energy | CO2 | Efficiency improvement in services/ tertiary sector | Economic | Planned | Support to upgradings in Public Administration buildings will be strengthened, in order to play a guide role for the entire economic sector. | 2020 | Ministry of economic development , Ministry of environment land and sea | NE | IE |
| Kyoto Fund Review | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Extension of the granting subsidized loans for financing energy efficiency in sport facilities and health buildings | 2020 | Ministry of economic development, Ministry of environment land and sea | NE | IE |

### *4.9 Policies in the Transport sector*

***Infrastructural measures***

This is a management measure regarding enhancement of road urban public transport network. The objective is to improve the high-speed networks and tuning of regional networks for commuting and goods.

***Fleet update***

This measure aims to improve the efficiency of vehicles providing subsidy to change older cars with new ones with average emissions of 120 CO2/km (130 gCO2/km engines efficiency plus -10 gCO2/km from additional reduction tools).

***Mandatory use of biofuels in the transport sector***

The Legislative Decree 28/2011 (transposition of directive 2009/28/EC) envisages mandatory use biofuels target 10% to 2020). This measure also include the mandatory use of renewable electricity by railways.

***Incentives to biomethane and other advanced biofuels***

Promotion of biogas and advanced biofuels for the performance obligation existing for blending of fossil fuels with biofuels. To monitor the quantity of biofuels supplied to the Italian market, are created certificates known as "Certificati Immissione in Consumo (CIC)" (Ministerial Decree 2 March 2018), that are tradable through a dedicated platform. The incentive fee is charged to the obliged parties (oil companies that introduce fossil fuels for consumption) and does not affect the electricity and gas bills. This incentive system is expected to cover the expected demand for methane in road transport with biomethane, corresponding to around 1.1 billion m3 per year.

***Implementation of the RED II with specific obligations on biofuels and other renewable***

This Directive, approved by European Parliament on 13 November 2018, establishes a common framework for the promotion of energy from renewable sources. It sets a binding Union target for the overall share of energy from renewable sources in the Union's gross final consumption of energy in 2030, equal to 32%. The Commission’s original proposal did not include a transport sub-target, which has been introduced by co-legislators in the final agreement: Member States must require fuel suppliers to supply a minimum of 14% of the energy consumed in road and rail transport by 2030 as renewable energy. Moreover, fuels used in the aviation and maritime sectors can opt in to contribute to the 14% transport target but are not subject to an obligation. It also lays down rules on financial support for electricity from renewable sources and establishes sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels.

***Certification of biofuel sustainability***

Biofuel sustainability certification systems measure and verify environmental performance of fuels throughout all major stages of the product life cycle, production, fuel production, and end use including feedstock. This is in accordance with-Italian National Biofuels and Bioliquids Sustainability Certification System (“Sistema Nazionale di Certificazione della sostenibilità dei biocarburanti e dei bioliquidi”), established by the Decree of 23 January 2012 of the Italian Ministry of the Environment and the Protection of the Territory and the Sea.

***National Infrastructural Plan for the recharging of electricity powered vehicles - PNIRE***

The PNIRE (National Plan for Electric charging Infrastructure), adopted by the Ministry of Infrastructures and Transport, has as its object the construction of infrastructure networks for recharging vehicles powered by electricity. It also defines the guidelines to guarantee the uniform development of electric vehicle charging services in the national territory.

***Infrastructure upgrading (regional rail transport and rapid mass transport systems)***

Increase of high capacity and high speed rail networks.

***Urban Plans for Sustainable Mobility – PUMS***

A Sustainable Urban Mobility Plan (COM(2013) 913 final) has as its central goal improving accessibility of urban areas and providing high-quality and sustainable mobility and transport to, through and within the urban area. A Sustainable Urban Mobility Plan presents, or is linked to an existing, long-term strategy for the future development of the urban area and, in this context, for the future development of transport and mobility infrastructure and services.

***Renewal of public transport vehicles***

Renewal of the fleet of local public transport companies, renewal of railway convoys and obligation for public administrations to purchase vehicles using alternative fuels.

***Renewal of private passenger vehicles (incentives to buy more efficient vehicles and with lower GHG emissions, regulatory measures, alternative fuel refueling points - DAFI)***

Promoting and supporting renewal of car fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles, including CNG and LPG cars.

***Modal shift of passenger transportation (mobility management measures)***

Modal shift from private cars to public transport, car-pooling, bikes and walking.

***Modal shift in freight transport***

Marebonus and Ferrobonus incentive to shift goods away from road. The Marebonus is the incentive envisaged by the Stability Law for the 2016-2018 three-year period in order to develop the combined mode road-sea through the creation of new maritime services and the improvement of existing ones. The incentive is calculated on the transport units multiplied by the kilometric sections subtracted from the road distance on the Italian road network. Whereas, the Ferrobonus is the incentive provided by the Stability Law for the 2016-2018 three-year period to support combined transport and transfer on railways. The aim is to shift the traffic of goods from the road network to the railway network through an incentive for the use of intermodal transport and transport transhipped to and from logistic nodes and Italian interports, through an incentive aimed at companies that commission rail services and operators multimodal railway.

***National Fund for Energy Efficiency***

The National Fund for Energy Efficiency, established in 2014 by decree 102/2014 that adopted the Energy Efficiency Directive, an important financial instrument to support energy requalification of Public Administration's buildings and the interventions for the reduction of energy consumption in the sectors of industry and private services. The fund will offer guarantees and easy credit terms for investment in energy efficient industrial processes, district heating/cooling and building retrofitting. It was introduced by Invitalia, a public-owned investment agency that manages the fund, to a wide audience of stakeholders from all industrial sectors.

***White certificates (Certificati bianchi) mechanism with upgrading***

White Certificates, or Energy Efficiency Certificates ("TEE") are transferable securities which certify energy savings achieved in the final use of energy through interventions aimed at increasing energy efficiency. The TEE system is an incentive mechanism based on an obligatory primary energy saving regime for electricity and natural gas distributors.

***Support to LNG penetration in heavy freight transport (maritime and road) through taxation***

The development of LNG for navigation maritime and inland, as well as for road transport deriving from the Alternative Fuel Directive (DAFI) was taken into account. In detail, the directive DAFI (2014/94/UE) establishes a common framework of measures for the deployment of low carbon fuels infrastructure in the Union in order to minimize dependence on oil and to mitigate the environmental impact of transport. This Directive sets out minimum requirements for the building-up of recharging points for electric vehicles and refueling points for natural gas (LNG and CNG) and hydrogen, to be implemented by means of Member States' national policy frameworks, as well as common EU technical specifications for such recharging and refueling points.

***Renewal of vehicles for freight transport***

Promoting and supporting renewal of HDV and LDV fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles powered by alternative fuels, including CNG and LNG.

***Sustainable Urban Mobility Incentive Program (PrIMUS)***

The Sustainable Urban Mobility Incentive Program (PrIMUS), adopted by the Ministry for Environment, Land and Sea Protection (8/2/2019) is aimed at municipalities with at least 50,000 inhabitants and provides 15 million euros for sustainable urban mobility actions on three themes: development of cycle infrastructure, sharing mobility and mobility management activities.

**Table 4.4- Summary of policies in the Transport sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Measures in the transport sector | Yes | Transport | CO2 | Improved transport infrastructure (Transport), Efficiency improvements of vehicles (Transport), Low carbon fuels/electric cars (Transport) | Regulatory, Other (Planning) | Implemented | Measures to reduce emissions from transport sector | | Ministry of infrastructures and transport , Ministry of Economic Development, | 20,250.00 | NE |
| Infrastructural measures | Yes | Transport | CO2 | Improved transport infrastructure | Other (Planning) | Implemented | Increase of high speed rail networks and public transportation in urban area | 2008 | Ministry of infrastructures and transport | IE | NE |
| Emission standard for new car | Yes | Transport | CO2 | Efficiency improvements of vehicles | Regulatory | Implemented | Fleet update at 120 g CO2/km in 2015 and 95 g CO2/km in 2020 | 2006 | Ministry of Economic Development | IE | NE |
| Mandatory use of biofuels in the transport sector | Yes | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Implemented | Mandatory use biofuels (target 10% to 2020). This measure include also the mandatory use of renewable electricity by railways | 2008 | Ministry of Economic Development | IE | NE |
| Energy efficiency, renwevables and electrification in the transport sector | No | Transport | CO2 | Low carbon fuels/electric cars , Modal shift to public transport or non-motorized transport , Demand management/reduction , Efficiency | Economic, Regulatory, Other (Planning) | Planned | Increase energy end-use efficiency, support biofuels and other fuels with low environmental impact, support intermodality and emission reduction | 2020 | Ministry of Economic Development ,Ministry for the environment, Land and Sea Protection, Ministry of Agricultural, Food and Forestry Policies, Ministry of Infrastructures and Transports, GSE-Energy Services Operator | NE | 13,900.00 |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | improvements of vehicles , Modal shift in freight transport , Low carbon fuels for freight transport , Improve sustainable urban mobility | | | | | | | |
| Incentives to biomethane and other advanced biofuels | No | Transport | CO2 | Low carbon fuels/electric cars | Economic | Planned | Biofuels promotion: consumption in the transport sector of bio-methane and about advanced biofuels through the conversion of refineries and / or traditional biodiesel plants | 2020 | Ministry of Economic Development | NE | IE |
| Implementation of the RED II with specific obligations on biofuels and other renewables | No | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Planned | This Directive establishes a common framework for the promotion of energy from renewable sources. It sets a binding Union target for the overall share of energy from renewable sources in the Union's gross final consumption of energy in 2030. It also lays down rules on financial support for electricity from renewable sources and also establishes sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels. | 2020 | Ministry of Economic Development , Ministry for the environment, Land and Sea Protection/Ministry of Agricultural, Food and Forestry Policies | NE | IE |
| Certification of biofuel sustainability | No | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Planned | Biofuel sustainability certification systems measure and verify environmental performance of fuels throughout all major | 2020 | Ministry of Economic Development , Ministry for the environment, Land and Sea Protection, Ministry of | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | stages of the product life cycle, production, fuel production, and end useincluding feedstock. | | Agricultural, Food and Forestry Policies | | |
| National Infrastructural Plan for the recharging of electricity powered vehicles - PNIRE | No | Transport | CO2 | Low carbon fuels/electric cars | Other (Planning) | Planned | The PNIRE (National Plan for Electric charging Infrastructure), adopted by the Ministry of Infrastructures and Transport, has as its object the construction of infrastructure networks for recharging vehicles powered by electricity . It also defines the guidelines to guarantee the unitary development of the recharge service vehicles powered by electricity in the national territory. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Infrastructure upgrading (regional rail transport and rapid mass transport systems) | No | Transport | CO2 | Modal shift to public transport or non-motorized transport | Other (Planning) | Planned | Increase of high capacity and high speed rail networks | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Urban Plans for Sustainable Mobility - PUMS | No | Transport | CO2 | Modal shift to public transport or non-motorized transport | | Planned | A Sustainable Urban Mobility Plan has as its central goal improving accessibility of urban areas and providing high-quality and sustainable mobility and transport to, through and within the urban area. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Renewal of public transport vehicles | No | Transport | CO2 | Low carbon fuels/electric cars | Economic | Planned | Promoting and supporting renewal of car fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles, including CNG and LPG cars. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Renewal of private passenger vehicles (incentives to buy more efficient vehicles and with lower GHG emissions, regulatory measures, alternative | No | Transport | CO2 | Low carbon fuels/electric cars | Economic | Planned | Promoting and supporting renewal of car fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles, including CNG and LPG cars. | 2020 | Ministry of Infrastructures and Transports | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| fuel refueling points - DAFI) | | | | | | | | | | | |
| Modal shift of passenger transportation (mobility management measures) | No | Transport | CO2 | Modal shift to public transport or non-motorized transport | Economic | Planned | Modal shift from private cars to public transport, car-pooling, bikes and walking | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Modal shift in freight transport | No | Transport | CO2 | Modal shift in freight transport | Economic, Other (Planning) | Planned | Marebonus and Ferrobonus incentive to shift goods away from road | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| National Fund for Energy Efficiency | No | Transport | CO2 | Demand management/reduction | Economic | Planned | The National Fund for Energy Efficiency, an important financial instrument to support the reduction of energy consumption | 2020 | Ministry of Economic Development | NE | IE |
| White certificates (Certificati bianchi) mechanism with upgrading | No | Transport | CO2 | Efficiency improvements of vehicles | Economic | Planned | Update and widen mechanism to support energy savings | 2020 | GSE- Energy Services Operator | NE | IE |
| Support to LNG penetration in heavy freight transport (maritime and road) through taxation | No | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Planned | The development of LNG for navigation maritime and inland, as well as for road transport deriving from the DAFI directive was taken into account. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Renewal of vehicles for freight transport | No | Transport | CO2 | Low carbon fuels for freight transport | Economic | Planned | Promoting and supporting renewal of HDV and LDV fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles powered by alternative fuels, including CNG and LNG. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Sustainable Urban Mobility Incentive Program (PrIMUS) | No | Transport | CO2 | Improve sustainable urban mobility | Other (Planning) | Planned | The Sustainable Urban Mobility Incentive Program (PrIMUS) is aimed at municipalities with at least 50,000 inhabitants and provides 15 million euros for sustainable urban mobility actions on three themes: development of cycle infrastructure, | 2020 | Ministry of Economic Development | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affecte d | Objective and/or activity affected | Type of instrument | Status of implementatio n | Brief description | Start year of implementatio n | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | sharing mobility and mobility management activities. | | | | |

### *4.10 Policies in the Industrial Processes sector*

In the Italian industrial processes sector, the reduction of $N_2O$ emissions from nitric acid production plants has been achieved through the installation of SCR (Selective Catalytic Reduction) systems by the most important producers. This activity has been included in the Emission Trading Scheme starting from 2012.

In order to control emissions from fluorinated greenhouse gases (F-gases), including hydrofluorocarbons (HFCs), the European Union has adopted the F-gas Regulation, which applies since 1 January 2015. The F-gas Regulation, that replaces the first F-gas Regulation adopted in 2006, is in line with the targets of Kigali Amendment to the Montreal Protocol, signed in Rwanda on October 2016 with the aim to reduce the production and consumption of hydrofluorocarbons (HFCs). The F-gas Regulation put in place a phase-down of HFCs for the period 2015 – 2030, based on a quota system and bans on high GWP refrigerants used in different sectors.

These measures are affecting the cost and availability of high global warming potential synthetic refrigerants with an increase of their price and a reduction of the availability on the market.

In Italy, many companies are developing innovations and advanced technological solutions aimed at reducing GHG emissions and complying with EU Regulation 517/2014.

The Italian market is adapting to the provisions of the Regulation much more quickly than the initial forecasts, due not only to the Regulation but also to independent market strategies.

Prices of refrigerants, especially those with higher GWP (R-404A, HFC-134a), increase with growth rates higher than those observed in other European countries (e.g: France and Spain) and, as early as 2017, supply difficulties were reported. In general, the effects of these changes in the market differ from sector to sector and those sectors that already own alternatives to HFCs have started to use low GWP refrigerants or natural refrigerants. The transition to these alternatives indeed involves new potential problems such as toxicity, flammability, corrosivity, high working pressures and energy efficiency of the appliances, with repercussions on the technical and economic feasibility of the alternatives that not all the sectors using HFCs can afford.

The refrigeration has been the first sector in Italy to implement measures to adapt to the F-gas Regulation. The domestic refrigeration sub-sector has already migrated to natural refrigerants: domestic refrigerators have long been using isobutane as a refrigerant fluid whose sales started several years before 2015, year of the ban for sale of HFCs domestic equipments with GWP>150. The air conditioning sector instead reports difficulty in adapting to the Regulation; unlike the small portable air conditioners, already migrated to hydrocarbons (HCs), for the other equipments with higher charge, natural refrigerants as well as hydrofluorolefines (HFOs) are not considered viable alternatives for safety reasons and technical-economic feasibility. If the air conditioning sector is not yet ready to switch to alternative refrigerants, keeping the current productions is also becoming increasingly difficult, due to the drastic decrease in the availability of HFCs and the increase in their cost. The other sectors (i.e. foams, aerosols and stationary fire protection systems) are ready to switch to alternatives (natural refrigerants, HFOs, or chemical gases), some of which have already been used.

Also these sectors have reported the decrease in the availability of HFCs; in the field of polyurethane foams, for example, where HFCs are used as blowing agents, experts believed that the exit from the market of hydrofluorocarbon-based blowing agents could have been possible since 2018.

Estimations of the consumption of refrigerant gases in Italy in 2030 were provided by industry experts, producers and importers of refrigerant gases. According to these estimates, the total quantity of refrigerants consumed in Italy by 2030 will remain at current values, while, due to the F-gas Regulation, the ratios among substances will change. The transition to refrigerants with minor or no greenhouse effect will cause a reduction of the average GWP from 1.030, the current average value, to 365. In particular, a strong increase in $CO_2$ consumption is expected (from 150 to 1,000 t). The use of HCs is also expected to increase (from 140 to 400 t), together with HFOs, while the consumption of HFCs will fall from about 9,150 to about 800 t. The regenerated HFC products will play a significant role in the future

and their consumption will grow exponentially, going from 80 to 2,000. For the period 2016-2030 the reduction in emissions expressed in t CO2 equivalents is estimated to be around 81%.

In Italy, no specific additional national measures have been adopted to reduce the use of the HFC.

**Table 4.5- Summary of policies in the Industrial Processes sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduction of emissions of N2O from nitric acid production | Yes | Industry/industrial processes | N2O | Installation of abatement technologies (Industrial processes) | Voluntary Agreement | Implemented | Significant reductions in process emissions from nitric acid production plants due to the application of BAT ( Best Avalaible Technology) | 2010 | Plants | 740.00 | NE |

### *4.11 Policies in the Agriculture sector*

In the last years, the role of agriculture in climate change mitigation has been emphasised. In this context, the reform of the Common Agricultural Policy (CAP) has a relevant role. In 2008, the CAP has been reinforced by the Health Check, which strengthens the gradual shift from a financial support linked to production towards decoupled direct aids, through a strengthening of the rural development policy and the increasing integration of environmental considerations, including climate change.

Therefore, payments for farmers consider the respect of environmental laws and other types of legislation. Thus, the incentives for intensive production have reduced. On the other hand, main emission reduction activities are predominantly or exclusively supported by two rural development measures: farm modernisation (code 121) and agri-environment (code 214). Some activities support the modernisation of farms through energy efficient equipment and buildings, and promoting biogas production[10]. This picture has been also assessed by ISPRA in the 21 regional Rural Development Plans (RDPs), where measure code 214 is most likely to contribute with $N_2O$ emission reductions. In 2008, a report[11] prepared by the Ministry of Agriculture (MIPAAF) in the framework of the Rural Development Network has assessed qualitatively the contribution of Rural Development Plans (RDPs) in terms of their mitigation potential. Moreover, in 2009, the CAP Health Check targets have been included in the RDPs[12]. In 2010, some general information on the number of RDPs that have considered climate change targets (15 RDPs) or all 6 Health Check targets (3 RDPs), is available[13].

The reduction measures which are presented below have also been considered in CAP reforms, characterized by a progressive reinforcement for integrating environmental legislation. A special attention is given for example to the Nitrates Directive (monitoring of water quality; designation of nitrate vulnerable zones; and, establishment of codes of good agricultural practice).

In 2013, political agreement on the reform of the CAP 2014-2020[14] was reached. The agreement provides for an amendment to the payment ecological (greening). Between 2014 and 2020, over EUR 100 billion will be invested to help farming meet the challenges of soil and water quality, biodiversity and climate change:

- 30% of direct payments will be linked to three agricultural practices beneficial for the climate and environment: crop diversification (there is no obligation for diversification of crops for arable land less than 10 hectares), maintaining permanent grassland (there is no obligation for arable land less than 15 hectares and for permanent crops) and conserving 5%, and later 7%, of areas of ecological interest as from 2018 or measures considered to have at least equivalent environmental benefits.
- At least 30% of the rural developments programmes' budget will have to be allocated to agri-environmental measures, support for organic farming or projects associated with environmentally friendly investment or innovation measures.
- Agri-environmental measures will become agri-environment-climate payments and will be stepped up to complement greening practices. These programmes will have to set and meet higher environmental protection targets (guarantee against double funding).

According to the European Commission[15], in the period up to 2020, the new CAP is going to invest around EUR 37.5 billion (as a sum of total allocation of Direct Payments and Rural Development for the period 2014-2020) in Italy's farming sector and rural areas. This amount will be distributed between rural development programs and direct payments as follows. In the period 2014-2020, the EU budget for measures benefiting agricultural producers and the economy of its rural areas will be a total of around EUR 10.4 billion (plus co-financing from public and private funds), increasing Italy's rural development

[10] European Commission (2009), Commission staff working document. The role of European agriculture in climate change mitigation. SEC (2009) 1093 final (http://ec.europa.eu/agriculture/climate_change/sec2009_1093_en.pdf)

[11] MIPAAF (2008), "Il contributo dei piani di sviluppo rurale e della condizionalità alla mitigazione dei cambiamenti climatici e al loro adattamento. Rete Rurale Nazionale 2007-2013 Italia", November 2008

[12] See the publication "The Contribution of Rural Development Programmes in Mitigating Greenhouse Gas Emissions in Italy" Climate Change and the Sustainable Use of Water Resources - Climate Change Management 2012, pp 367-387

[13] MIPAAF (2010), "Le nuove sfide della PAC e le misure di rilancio dell'economia nei programmi di sviluppo rurale 2007-2013 – Aprile 2010. Rete Rurale Nazionale 2007-2013" (www.reterurale.it)

[14] http://ec.europa.eu/agriculture/cap-post-2013/index_en.htm

[15] European Commission, 2016. CAP in your country: ITALY (https://ec.europa.eu/agriculture/cap-in-your-country_en)

envelope compared to the period 2007-2013. The total budget available for direct payments in Italy for the period 2014-2020 amounts to more than EUR 27 billion.

Although there are, by definition, differences in the Rural Development Programs (RDPs) priorities from one region to another, from an analysis of the information reported in the 21 regional RDPs for 2014-2020, most of the Italian regional programs are looking to target public support at enhancing the competitiveness of agricultural production systems and of agro-industry enterprises support investments in sustainable energy as well as to promote climate change adaptation and protecting the environment and increasing the quality of life and economic diversification in rural areas[16]. In particular, considering the measures planned to achieve the objectives established by the European Commission of "reducing greenhouse gas and ammonia emissions from agriculture" and "fostering carbon conservation and sequestration in agriculture and forestry", 15 RDPs supported investments in knowledge transfer and information actions (art. 14 of European Regulation N. 1305/2013), 13 RDPs have provided support to advisory services, farm management and farm relief services (art 15 of European Regulation N. 1305/2013) and 3 RDPs have explicitly indicated the objective of reducing greenhouse gas and ammonia gas emissions (measure related to investments in physical assets as in art 17 of European Regulation N. 1305/2013)[17]. Regarding the measure on agro-climate-environmental payments (art. 28 of European Regulation N. 1305/2013), aimed at preserving and promoting the necessary changes in agricultural practices that contribute favourably to the environment and the climate, Emilia Romagna, Lombardy and Piedmont regions have planned investments concerning the distribution of livestock effluents, aimed at reducing ammonia emissions. Lazio and Umbria have planned a measure to maintain/increase the organic matter of the soil through the use of organic additives with valuable organic matter[18].

The Nitrates Directive aims to reduce the release of nitrogen compounds to the water, and this has an impact in terms of reducing indirect emissions of nitrous oxide and imposing measures to increase nitrogen efficiency in distribution agronomic effluent from breeding, tends to reduce ammonia emissions and direct emissions of nitrous oxide.

The technical measures in application of the Nitrates Directive are contained in the Nitrate Action Programs (PAN, in Italian), which the Regions have had to issue and periodically review. The PAN establish spatial and temporal prohibitions, methods and techniques, maximum doses and contributions in the agronomic distribution of breeding effluents, as well as criteria for sizing and characteristics of the effluent storage containers. The most recent action programs also regulate the agronomic use of digestate deriving from biogas plants.

In the PANs of most of the regions and, in particular in the regions of the Po valley basin, the use of low-pressure slurry distribution means is required as well as the incorporation of the effluents within 24 hours from the spreading. For the newly built storage containers is required to be equipped with a cover or to be made with a low surface/volume ratio.

The current environmental legislation also provides for the application of the measures envisaged by the new BAT-Cs (Best Available Technologies Conclusions), as defined in the framework of the European Directive 2010/75/EU relating to industrial emissions (IED Directive), and by the Air Quality Recovery Plans in the Po Valley regions, as part of the EU directive 2008/50/EC on air quality and cleaner air in Europe.

The IED aims to avoid or minimize polluting emissions in the atmosphere, water and soil, as well as waste from industrial and agricultural plants, in order to achieve a high level of protection of the environment and health. Large production plants have to request the integrated environmental authorization (AIA, in Italian), issued by a competent authority, and shall implement the BAT-C.

Pig and poultry farms above a certain production threshold are the zootechnical activities subject to AIAand the implementation of the new BAT-Cs in these farms will lead to a greater diffusion of low-

[16] See note 22
[17] ISMEA/RRN (2017), "Analisi dei bandi regionali per gli interventi che concorrono alla realizzazione delle Focus Area 5D e 5E" (http://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/16780)
[18] See note 24

protein diet, to cover manure storage, where technically feasible, to low emission effluent distribution methods.

The measures provided for in the Regional Air Quality Plans concern the containment of ammonia emissions from animal husbandry and storage of cattle, pig and poultry manure and during the distribution of manure, as well as upstream measures to reduce nitrogen excretions, as the reduction of the crude protein content in food rations.

In addition, the 2014-2020 RDPs, as mentioned, contain various measures aimed at reducing emissions through the incentive of structural interventions (Measure 4 - Investments) and operational (Measure 10 - Agri-climatic environmental commitments). The former are financing investments aimed at reducing ammonia and greenhouse gas emissions with interventions on shelters, storage facilities and effluent treatment and distribution equipment. The latter make contributions per hectare conditioned by the use of low emission effluent distribution techniques.

### *Emissions of nitrous oxide from agricultural soil*

Emission reduction from the Agricultural soil source is mainly related to the rationalisation in the use of fertilizers. RDPs 2007-2013 are contributing with this emission reduction measure (code 214). In order to achieve the objective, it is essential to consider ongoing efforts to raise awareness on the code of agricultural practice (such as fertiliser application limits and spreading conditions, manure storage methods, livestock density limits and crop rotation requirements), and the integrated production of agricultural property and organic farming. However, when considering organic farming[19] as an instrument for climate change mitigation, both the amount of emission per hectare and per unit of production have to be considered[20]. RDPs 2014-2020 are contributing through this emission reduction measure (Agri-environment-climate - art. 28 of European Regulation N. 1305/2013).

### *Emissions of methane from manure management*

Electricity generation from animal waste has increased in Italy up to 1193.8 GWh in 2017, (more than 5 times the 2010 value), thanks to the support provided by the feed-in prices granted by Resolution no. 6/92 of the Inter-ministerial Price Committee (CIP 6/92) and the renewable quota obligation for electricity producers/importers established by the Legislative Decree of March 16, 1999, No. 79, and subsequent legislations.
Moreover, as established by Ministerial Decree of 18 December 2008, the Ministry of Economic Development has approved incentives for the production of electric power from renewable energy. A special tariff (called *"All-Inclusive Feed-In Tariff"*) for small agro-energetic facilities (in operation after 31/12/2007) of less than 1 MW feed with biogas, biomass or vegetal oil, has been fixed. Instead, for facilities of more than 1 MW a multiplying factor of 1.8 for estimating green certificates is contemplated, specifically for facilities using agricultural biomass. In section 4.4 (renewable energy sources), the recent legislation on these issues is described. Further intervention may be required for the coming years in order to sustain this trend, and to extend the covering of animal waste storage systems, equipped with devices allowing collection and use of biogas, not only to new farms but also to major existing ones.

[19] Some studies show contrasting results of emissions per unit of product in organic farming, particularly regarding methane. A German study (referenced by PICCMAT final report) shows lower GHG emissions per unit of product in organic farming than conventional methods for wheat, pig and milk production, while results for beef production are more ambiguous due to the variety of production system.

[20] European Commission (2009), Commission staff working document. The role of European agriculture in climate change mitigation. SEC (2009) 1093 final (http://ec.europa.eu/agriculture/climate_change/sec2009_1093_en.pdf)

**Table 4.6- Summary of policies in the Agriculture sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Emissions of nitrous oxide from agricultural soil - Nitrogen fertilizer | Yes | Agriculture | N2O | Reduction of fertilizer/ manure use on cropland | Regulatory | Implemented | Rationalisation in the use of nitrogen fertilizer | 2007 | Ministry of Agriculture | 790.00 | NE |
| Emissions of methane from manure management | Yes | Agriculture | CH4 | Improved animal waste management systems | Regulatory | Implemented | Recovery of biogas from animal storage system | 2008 | Ministry of Agriculture | 400.00 | NE |

### *4.12 Policies in Land use, land-use change and forestry (LULUCF) sector*

On 3 April 2018, the TUFF was promulgated with Legislative Decree no. 34, which repeals Legislative Decree 227 of 2001 on "Orientation and modernization of the forest sector". The TUFF provides guidelines on sustainable forest management, and it is aimed to define a new National Forest Strategy (2019-2039). The NFS is aimed to promote the sustainable forest management as an instrument to increase the net absorption of carbon, to guarantee all goods and services provided by forests and to promote the production of wood products. The new NFS, in the drafting phase, in line with the provisions of the eight Priority Areas of the European Forestry Strategy (COM (2013) n. 659) of 2013, defines clear goals, aimed at:

- overcome the economic and environmental emergencies of forest interest;
- build a system that encourages sustainable forest management and the production of public goods and services, especially for mitigation;
- develop the sector and its production, environmental and socio-cultural supply chains;
- guaranteeing security and development, protection and enhancement of natural capital, of which the forest patrimony and sector are essential components.

In order to support the process of drafting the new National Forest Strategy, the Ministry of Agricultural, Forestry and Tourism Policies has collected and summarized in a White Paper[21] the contributions, observations and proposals that emerged during a long process of public consultations[22] between 2016 and 2017.

In this context, a gradual increase in the utilization rates is expected over a ten-year period, with a shift from the current 30-33% of the annual forest growth up to 40-45%.

Historical management practices in the Italian forests have been guided by the Legislative Decree n. 227 of 18 May 2001, although the design and implementation of specific guidelines has been carried out at regional level since, according to the Italian Constitutional Law, the forest management is a regional competence. From 2008 onward such guidance has been further elaborated in the Framework Program for the Forestry Sector (Programma Quadro per il Settore Forestale - PQSF) for the protection, enhancement and sustainable management of the national forest patrimony in compliance with the commitments undertaken at international and European level. Such goals are to be achieved within 4 area of action: bio-economy, conservation, including conservation and enhancement of the forest carbon stocks, rural and social development, socio-recreational and educational functions and public awareness.

In order to increase the quality of the information on Italian forests, each year a Annual Report on Italian Forests (RAF) will be prepared. The report is aimed to strengthen the knowledge of Italian forests in all their aspects: naturalistic, productive, economic, etc. Furthermore, information shall be collected from all the stakeholders involved, including Regional governments, local authorities, ISTAT, as well as the economic and scientific sector.

In 2018 Italy prepared the National Forestry Accounting Plan[23], in the framework of the Regulation (EU) 2018/841 on the inclusion of greenhouse gas emissions and removals from LULUCF in the 2030 climate and energy framework (LULUCF Regulation), and amending Regulation (EU) 525/2013 and Decision 529/2013/EU. The Plan contains the Italy Forest Reference Level (FRL), for the period from 2021 to 2025, in accordance with paragraph 3 of article 8 of the LULUCF Regulation.

[21] Available at https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/19358
[22] National Forum of Forests - www.reterurale.it/foreste
[23] Available at https://www.minambiente.it/sites/default/files/archivio/allegati/clima/NFAP_final.pdf

### *4.13 Policies in the Waste sector*

Emissions reduction in the waste sector is mainly related to the improvement of waste management regarding the composition of waste disposed to landfills. In fact, the Landfill European Directive 1999/31/EC has been transposed at the national level by Legislative Decree 13 January 2003 n. 36 and applied to Italian landfills since July 2005, although the effectiveness of the policies will be significant in the future. This implies a continuous updating of the regulatory system.

Consequently, in the following years, the Ministry of the Environment has issued some decrees (Legislative Decree 30 December 2008, n. 208 and Ministerial Decree 24 June 2015) on the waste acceptance criteria in landfills since the composition of waste is strongly changed and is still evolving.

For the waste sector two measures are proposed:

- Compliance with separate collection targets and biodegradable waste disposed to landfills:
    - fulfilment of the deadlines set for MSW separate collection;
    - fulfilment of the deadlines set for biodegradable waste sent to landfill.
- Only bio-stabilized waste disposed to landfills: a further measure regards the pre-treatment of all the biodegradable wastes which will be disposed to landfills, encouraging the anaerobic digestion of MSW also in co-digestion with other type of waste such as sludge from municipal waste water treatment plants and animal waste. This practice will also increase the energy recovery from the biogas production.

**Table 4.7- Summary of policies in the Waste sector**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Increase separate collection of urban waste | Yes | Waste management/waste | CH4 | Reduced landfilling | Regulatory | Implemented | Compliance with separate collection targets and reduction of biodegradable waste disposed into landfills | 2008 | Regions | 3,700.00 | NE |

### *4.14 Summary of policies and measures*

A summary of implemented and planned measures are reported in the tables below.

**Table 4.8- Table 3 of the Common Tabular Format (CTF) - Progress in achievement of the quantified economy-wide emissions reduction target: information on mitigation actions and their effects**

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Electricity production by renewable use | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Subsidied and Support system for renewable electricity production | | Ministry of economic development | 8,600.00 | NE |
| Conto Energia | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 25000 MW at 2020 | 2010 | Ministry of economic development | IE | NE |
| Green Certificate and "Omnicomprensiva" Tariff | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Subsidied and Support system for renewable electricity production different from photovoltaic plants | 2009 | Ministry of economic development | IE | NE |
| White certificates - Cogeneration - mechanism with upgrading | Yes | Energy | CO2 | Efficiency improvement in the energy and transformation sector | Economic | Implemented | Supporting CHP and district heating plants | 2015 | GSE - Energy Services Operator | 1,210.00 | NE |
| White certificates - Industry | Yes | Energy | CO2 | Efficiency improvement in industrial end-use sectors | Economic | Implemented | Supporting electric energy saving in the industry sector | 2009 | GSE - Energy Services Operator | 4,600.00 | NE |
| Reduction of emissions of N2O from nitric acid production | Yes | Industry/industrial processes | N2O | Installation of abatement technologies (Industrial processes) | Voluntary Agreement | Implemented | Significant reductions in process emissions from nitric acid production plants due to the application of BAT ( Best Avalaible Technology) | 2010 | Plants | 740.00 | NE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum energy performance requirements for buildings | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Regulatory | Implemented | Application of the minimum energy performance requirements for buildings. These requirements apply to public and private buildings, whether they are new buildings or existing buildings subject to restructuring | 2006 | Ministry of Economic Development | 3,610.00 | 4,000.00 |
| Energy efficiency in building | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Fiscal, Economic | Implemented | Measures of energy saving and energy efficiency in the civil sector | | Ministry of Finance and GSE - Energy Services Operator | 7,190.00 | NE |
| Tax deduction for energy saving in buildings | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Fiscal | Implemented | Supporting of energy saving in existing buildings through tax deduction of 65%, 55% or 36% based on the savings expected | 2008 | Ministry of Finance | IE | NE |
| Thermal account | Yes | Energy | CO2 | Efficiency improvements of buildings (Energy consumption) | Economic | Implemented | Incentives for small-scale energy efficiency measures in buildings and production of thermal energy from renewable sources | 2012 | GSE - Energy Services Operator | IE | NE |
| Measures in the transport sector | Yes | Transport | CO2 | Improved transport infrastructure (Transport), Efficiency improvements of vehicles (Transport), Low carbon fuels/electric cars | Regulatory, Other (Planning) | Implemented | Measures to reduce emissions from transport sector | | Ministry of infrastructures and transport , Ministry of Economic Development, | 20,250.00 | NE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (Transport) | | | | | | | |
| Infrastructural measures | Yes | Transport | CO2 | Improved transport infrastructure | Other (Planning) | Implemented | Increase of high speed rail networks and public transportation in urban area | 2008 | Ministry of infrastructures and transport | IE | NE |
| Emission standard for new car | Yes | Transport | CO2 | Efficiency improvements of vehicles | Regulatory | Implemented | Fleet update at 120 g CO2/km in 2015 and 95 g CO2/km in 2020 | 2006 | Ministry of Economic Development | IE | NE |
| Mandatory use of biofuels in the transport sector | Yes | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Implemented | Mandatory use biofuels (target 10% to 2020). This measure include also the mandatory use of renewable electricity by railways | 2008 | Ministry of Economic Development | IE | NE |
| Emissions of nitrous oxide from agricultural soil - Nitrogen fertilizer | Yes | Agriculture | N2O | Reduction of fertilizer/ manure use on cropland | Regulatory | Implemented | Rationalisation in the use of nitrogen fertilizer | 2007 | Ministry of Agriculture | 790.00 | NE |
| Emissions of methane from manure management | Yes | Agriculture | CH4 | Improved animal waste management systems | Regulatory | Implemented | Recovery of biogas from animal storage system | 2008 | Ministry of Agriculture | 400.00 | NE |
| Increase separate collection of urban waste | Yes | Waste management/waste | CH4 | Reduced landfilling | Regulatory | Implemented | Compliance with separate collection targets and reduction of biodegradable waste disposed into landfills | 2008 | Regions | 3,700.00 | NE |
| Energy production and transformation | No | Energy | CO2 | Increase in renewable energy | Regulatory, Economic, Other (Planning) | Planned | Promotion and support to the renewable energy sources | 2020 | ARERA - Italian Regulatory Authority for Electricity Gas and Water, Ministry of Economic Development, Ministry for the environment, Land and Sea Protection, Regions, GSE - Energy Services | NE | 24,600.00 |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Operator | | |
| Exemption from charges for self-consumption in small plants | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Support the self-consumption of the electricity produced by single and multiple (renweable energy communities) small installations throguh the reduction of system and network costs | 2020 | ARERA - Italian Regulatory Authority for Electricity Gas and Water | NE | IE |
| Promotion of Power Purchase Agreement (PPAs) for renewable energy plants | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Update the present regulation and set up new regulatory and technical reference to help penetration of PPA with no additional costs for public fincance or citizens | 2020 | Ministry of Economic Development | NE | IE |
| Incentives for large renewable source plants through competitive procedures aimed at the most mature technologies | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Payment of the difference between tariff and market price of electricity where the difference is positive; refund by the producer if the difference is negative | 2020 | Ministry of Economic Development | NE | IE |
| Support for large renewable energy plants with innovative technologies that are not competitive yet | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Definition of specific tariffs for innovative production technologies and, where possible, support to investments and research&development | 2020 | Ministry of Economic Development | NE | IE |
| Aggregation of small plants to facilitate the access to incentives | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Aggregation of small installations will have access to competitive procedures as large renewable source plants | 2020 | Ministry of Economic Development | NE | IE |
| Concertation with local authorities for the identification of suitable areas for the installation of renewable energy plants | No | Energy | CO2 | Increase in renewable energy | Other (Planning) | Planned | Government will set up a database of built-up areas suitable for PV installations. Region and local competent authorities will identify non built-up areas were renewable plants, storage | 2020 | Ministry of Economic Development , Ministry for the environment, Land and Sea Protection, Regions, Municipalities | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | systems and network appliances can be installed with simplified procedures | | | | |
| Revamping/repowering and optimization of existing plants | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Simplification of authorizations and procedures for revamping / repowering of existing plants | 2020 | Ministry of Economic Development | NE | IE |
| Support for the installation of distributed storage systems | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Current rules on storage will be amended and a new regulatory framework will be established | 2020 | Ministry of Economic Development | NE | IE |
| Self-consumers and renewable energy communities | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Simplification of permit procedures for self-consumers and renewable energy communities in order to address, through a single procedure, permitting, network connection and access to support mechanisms | 2020 | Ministry of Economic Development | NE | IE |
| Revision of the regulations for the allocation of hydroelectric concessions | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | The auction procedures for the existing concessions will be integrated in the territorial planning, considering other uses of water, on the basis of homogeneous rules at national level, also in terms of fees. Procedures will transparently privilege the redevelopment of the plants, in order to ensure the useful storage capacity and increase the producibility, in compliance with environmental constraints. | 2020 | Ministry of Economic Development | NE | IE |
| Coal phase-out | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Planned to ban coal use for electricty production from 2025 | 2020 | Ministry of Economic Development | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Renewables in existing buildings | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Extension and improvement of the obligation to integrate renewables into existing buildings | 2020 | Ministry of Economic Development | NE | IE |
| Renewables in new buildings | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Improvement of the obligation to integrate renewables in new buildings | 2020 | Ministry of Economic Development | NE | IE |
| Incentives to electrical and thermal renewables use in the small islands | No | Energy | CO2 | Increase in renewable energy | Economic | Planned | Electricity network upgrade to have higher renewable penetration. Pilot projects regarding renewable productions, storage systems, development of electrical transport, integration of the electrical system with the water system | 2020 | GSE - Energy Services Operator | NE | IE |
| Energy efficiency, renwevables and electrification in the civil sector | No | Energy | CO2 | Efficiency improvements of buildings , Increase in renewable energy , Demand management/reduction , Efficiency improvement in services/ tertiary sector , Increase of consumption in thermal renewable energy sources | Economic, Fiscal, Regulatory | Planned | Increase energy efficiency and renewable energy production and emission reduction in the civil sector | 2020 | GSE- Energy Services Operator, Ministry of economic development, Ministry of environment land and sea, Ministry of Finance | NE | 12,700.00 |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| White certificates (Certificati bianchi) mechanism with upgrading | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Update and widen mechanism to support energy savings | 2020 | GSE- Energy Services Operator | NE | IE |
| Thermal account (Conto termico) mechanism with upgrading | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Update of the incentive schemes for small-scale energy efficiency measures in buildings and production of thermal energy from renewable sources | 2020 | Ministry of economic development , Ministry of environment land and sea | NE | IE |
| Renewables in existing and new buildings | No | Energy | CO2 | Increase in renewable energy | Regulatory | Planned | Extension and improvement of the obligation to integrate renewables into existing and new buildings | 2020 | Ministry of economic development, Ministry of environment land and sea | NE | IE |
| National Fund for Energy Efficiency | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Granting of guarantees on individual financing operations and provision of subsidized loans | 2020 | Ministry of economic development , Ministry of environment land and sea | NE | IE |
| Incentives for the promotion of electrical and thermal renewables in the small islands | No | Energy | CO2 | Increase of consumption in thermal renewable energy sources | Economic | Planned | Electricity network upgrade to have higher renewable penetration. Pilot projects regarding renewable productions, storage systems, development of electrical transport, integration of the electrical system with the water system | 2020 | Ministry of economic development ,Ministry of environment land and sea | NE | IE |
| Energy efficiency of residential buildings through tax deductions for building renovations and energy upgrading | No | Energy | CO2 | Efficiency improvements of buildings | Fiscal | Planned | Modulated benefit considering the expected savings on the entire technical life of the upgrade, in order to reward renovations with the best cost-effectiveness ratio and increase the propensity towards radical interventions on the building (deep renovation) and seismic improvement. | 2020 | Ministry of economic development , Ministry of environment land and sea, Ministry of Finance | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Efficient public lighting system | No | Energy | CO2 | Demand management/reduction | Regulatory | Planned | Obligation to make public lighting system more efficient | 2020 | Ministry of economic development, Ministry of environment land and sea | NE | IE |
| Energy upgrading program for the Central Public Administration (PREPAC) | No | Energy | CO2 | Efficiency improvement in services/ tertiary sector | Economic | Planned | Support to upgradings in Public Administration buildings will be strengthened, in order to play a guide role for the entire economic sector. | 2020 | Ministry of economic development , Ministry of environment land and sea | NE | IE |
| Kyoto Fund Review | No | Energy | CO2 | Efficiency improvements of buildings | Economic | Planned | Extension of the granting subsidized loans for financing energy efficiency in sport facilities and health buildings | 2020 | Ministry of economic development, Ministry of environment land and sea | NE | IE |
| Energy efficiency, renwevables and electrification in the industrial sector | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Economic, Regulatory, Fiscal | Planned | Increase energy efficiency and renewable energy production in the industrial sector | 2020 | GSE- Energy Services Operator, ENEA - Italian National agency for new technologies, Energy and sustainable economic development, Ministry of Economic Development | NE | 5,000.00 |
| White certificates (Certificati bianchi) mechanism with upgrading | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Economic | Planned | Update and widen mechanism to support energy savings | 2020 | GSE- Energy Services Operator | NE | IE |
| Energy audits in companies | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Regulatory | Planned | Co-financing of energy audits in SMEs; adoption of energy management systems compliant with ISO 50001 standards; extension to energy-intensive businesses in the gas sector and correlation of the benefit to the execution of energy efficiency interventions | 2020 | ENEA - Italian National agency for new technologies, Energy and sustainable economic development. | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| National Industry 4.0 Plan (Impresa 4.0) | No | Industry/industrial processes | CO2 | Efficiency improvement in industrial end-use sectors | Fiscal | Planned | Tax breaks and reductions to stimulate companies - micro, small and medium-sized enterprises and innovative startups - to invest in innovation. | 2020 | Ministry of Economic Development | NE | IE |
| Energy efficiency, renwevables and electrification in the transport sector | No | Transport | CO2 | Low carbon fuels/electric cars , Modal shift to public transport or non-motorized transport , Demand management/reduction , Efficiency improvements of vehicles , Modal shift in freight transport , Low carbon fuels for freight transport , Improve sustainable urban mobility | Economic, Regulatory, Other (Planning) | Planned | Increase energy end-use efficiency, support biofuels and other fuels with low environmental impact, support intermodality and emission reduction | 2020 | Ministry of Economic Development ,Ministry for the environment, Land and Sea Protection, Ministry of Agricultural, Food and Forestry Policies, Ministry of Infrastructures and Transports, GSE-Energy Services Operator | NE | 13,900.00 |
| Incentives to biomethane and other advanced biofuels | No | Transport | CO2 | Low carbon fuels/electric cars | Economic | Planned | Biofuels promotion: consumption in the transport sector of bio-methane and about advanced biofuels through the conversion of refineries and / or traditional biodiesel plants | 2020 | Ministry of Economic Development | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Implementation of the RED II with specific obligations on biofuels and other renewables | No | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Planned | This Directive establishes a common framework for the promotion of energy from renewable sources. It sets a binding Union target for the overall share of energy from renewable sources in the Union's gross final consumption of energy in 2030. It also lays down rules on financial support for electricity from renewable sources and also establishes sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels. | 2020 | Ministry of Economic Development , Ministry for the environment, Land and Sea Protection/Ministry of Agricultural, Food and Forestry Policies | NE | IE |
| Certification of biofuel sustainability | No | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Planned | Biofuel sustainability certification systems measure and verify environmental performance of fuels throughout all major stages of the product life cycle, production, fuel production, and end useincluding feedstock. | 2020 | Ministry of Economic Development , Ministry for the environment, Land and Sea Protection, Ministry of Agricultural, Food and Forestry Policies | NE | IE |
| National Infrastructural Plan for the recharging of electricity powered vehicles - PNIRE | No | Transport | CO2 | Low carbon fuels/electric cars | Other (Planning) | Planned | The PNIRE (National Plan for Electric charging Infrastructure), adopted by the Ministry of Infrastructures and Transport, has as its object the construction of infrastructure networks for recharging vehicles powered by electricity . It also defines the guidelines to guarantee the unitary development of the recharge service vehicles powered by electricity in the national territory. | 2020 | Ministry of Infrastructures and Transports | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Infrastructure upgrading (regional rail transport and rapid mass transport systems) | No | Transport | CO2 | Modal shift to public transport or non-motorized transport | Other (Planning) | Planned | Increase of high capacity and high speed rail networks | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Urban Plans for Sustainable Mobility - PUMS | No | Transport | CO2 | Modal shift to public transport or non-motorized transport | | Planned | A Sustainable Urban Mobility Plan has as its central goal improving accessibility of urban areas and providing high-quality and sustainable mobility and transport to, through and within the urban area. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Renewal of public transport vehicles | No | Transport | CO2 | Low carbon fuels/electric cars | Economic | Planned | Promoting and supporting renewal of car fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles, including CNG and LPG cars. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Renewal of private passenger vehicles (incentives to buy more efficient vehicles and with lower GHG emissions, regulatory measures, alternative fuel refueling points - DAFI) | No | Transport | CO2 | Low carbon fuels/electric cars | Economic | Planned | Promoting and supporting renewal of car fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles, including CNG and LPG cars. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Modal shift of passenger transportation (mobility management measures) | No | Transport | CO2 | Modal shift to public transport or non-motorized transport | Economic | Planned | Modal shift from private cars to public transport, car-pooling, bikes and walking | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Modal shift in freight transport | No | Transport | CO2 | Modal shift in freight transport | Economic, Other (Planning) | Planned | Marebonus and Ferrobonus incentive to shift goods away from road | 2020 | Ministry of Infrastructures and Transports | NE | IE |

| Name of mitigation action | Included in with measures GHG projection scenario | Sectors affected | GHGs affected | Objective and/or activity affected | Type of instrument | Status of implementation | Brief description | Start year of implementation | Implementing entity or entities | 2020 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| National Fund for Energy Efficiency | No | Transport | CO2 | Demand management/reduction | Economic | Planned | The National Fund for Energy Efficiency, an important financial instrument to support the reduction of energy consumption | 2020 | Ministry of Economic Development | NE | IE |
| White certificates (Certificati bianchi) mechanism with upgrading | No | Transport | CO2 | Efficiency improvements of vehicles | Economic | Planned | Update and widen mechanism to support energy savings | 2020 | GSE- Energy Services Operator | NE | IE |
| Support to LNG penetration in heavy freight transport (maritime and road) through taxation | No | Transport | CO2 | Low carbon fuels/electric cars | Regulatory | Planned | The development of LNG for navigation maritime and inland, as well as for road transport deriving from the DAFI directive was taken into account. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Renewal of vehicles for freight transport | No | Transport | CO2 | Low carbon fuels for freight transport | Economic | Planned | Promoting and supporting renewal of HDV and LDV fleet with low carbon fuels, speed up the replacement of vehicle fleet with new vehicles powered by alternative fuels, including CNG and LNG. | 2020 | Ministry of Infrastructures and Transports | NE | IE |
| Sustainable Urban Mobility Incentive Program (PrIMUS) | No | Transport | CO2 | Improve sustainable urban mobility | Other (Planning) | Planned | The Sustainable Urban Mobility Incentive Program (PrIMUS) is aimed at municipalities with at least 50,000 inhabitants and provides 15 million euros for sustainable urban mobility actions on three themes: development of cycle infrastructure, sharing mobility and mobility management activities. | 2020 | Ministry of Economic Development | NE | IE |
| Electricity production by renewable use | Yes | Energy | CO2 | Increase in renewable energy (Energy supply) | Economic | Implemented | Subsidied and Support system for renewable electricity production | | Government:Ministry of economic development | 8,600.00 | NE |

### *4.15 Estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use changes and forestry activities*

The use of flexible mechanisms takes place on the one hand by operators in the EU ETS, on the other hand by governments for the achievement of ESD targets (see section 2.2.2.3). Under the EU ETS, CERs and ERUs have been surrendered directly for compliance purpose until 2013; since 2014 it is no longer possible to track the use of flexible mechanisms directly because CERs and ERUs are no longer surrendered rather they are exchanged into EUAs. With regards to the ESD, there has been no use of flexible mechanisms up till now.

# 5. Projections[24]

## *5.1 Introduction*

Pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, Italy has recently submitted to the European Commission the first draft integrated national energy and climate plan. The draft plan is the result of a common effort of the Ministry of Economic Development, the Ministry of Environment, Land and Sea and the Ministry of Transport and Infrastructures and it is largely based on data and information provided by ISPRA, GSE and RSE. The draft has been finalized in December 2018, but the analytical process has started in 2016 under the Head of Government Office.

During 2019 the draft national plan is undergoing an extensive public consultation and a Strategic environmental assessment (SEA) that will help refining data, targets and policies and measures. Moreover, in April 2019 Italy has also submitted the national air pollution control program under the new National Emissions Ceilings Directive (2016/2284/EU). This program is also under public consultation and SEA.

This report is based on the draft national plan provided in December 2018, but, due to the processes that are in place, emission projections as well policies and measures are likely to be updated lately in 2020. For the same reason sensitivity analyses are still undergoing and will be finalized later in 2020.

The same assumptions used by the European Commission for PRIMES 2016 Reference scenario have been adopted, but the most recent macroeconomic data have been also taken into account. The base year for the projections is 2016, by the last emission inventory data submitted to UNFCCC and the WEM scenario considers the policies and measures implemented before December 31st, 2016.

The scenarios have been calculated with the partial equilibrium model TIMES (The Integrated MARKAL-EFOM1 System / EFOM Energy Flow Optimization Model), a model generator for local, national or multi regional economies finalized to the analysis of whole energy systems (electricity generation and consumption, heat distribution, transports, industries, civil, etc.). The model belongs to the family of MARKAL (Market Allocation, http://www.iea-etsap.org/web/Markal.asp) models, the so-called "3e models" (energy, economy, environment), and was developed by the International Energy Agency (IEA) under the program Energy Technology Systems Analysis Program (ETSAP). This model is recognized by the International Panel on Climate Change (IPCC).

The energy system thus simulated is composed by a number of different sectors and subsectors (e.g. electricity production, industrial activities, residential buildings, etc.), each one consisting of a set of technologies connected by input-output linear relationships. Inputs and outputs can be energy carriers, materials, emissions or requests for services. TIMES is a bottom-up, demand-driven model in which each technology is identified by technical and economic parameters and the production of a good is conditioned to the effective demand by end-users.

The structure of energy scenarios is defined by variables and equations determined by input data constituting the regional database. The database contains qualitative and quantitative data describing the interaction between different components of the energy system.

TIMES identifies the optimal solution to provide energy services at the lowest cost, producing simultaneously investments in new technologies or using more intensively the available technologies in each region defined by the user. For example, an increase in electricity demand for residential use can be satisfied with a more intensive use of available power plants or through the installation of new power plants. Model choices are based on the analysis of technological characteristics of available alternatives, the cost of energy supply and environmental criteria and bounds.

$CO_2$ emissions are directly calculated by the model implemented by ISPRA using IPCC "reference approach" methodology and national emission factors. The modelling approach avoids, in principle, the so called

[24] Author: Antonio Caputo, Emanuele Peschi

"double counting effect" for the implementation of policies, so the model evaluates the impacts and interactions among measures as a package. The model outcomes indicate the mix of technologies and primary emission sources fulfilling the commodity demands of the reference scenario at the lowest possible cost.

The model considers the effect of the average temperature change taking into account the dynamic of degree-days as in PRIMES 2016.

The emissions from non-energy sources and other energy related GHGs different from CO2 have been evaluated by a family of spreadsheet models used by ISPRA for the National Communications to UNFCCC.

The overall GHGs emissions and the share between ETS and non-ETS sectors are the results of the mentioned models implemented by ISPRA.

A "Without Measures" (WOM) scenario, calculated with the same methodology of WM scenario, could not be included, as most data on PaMs are not available starting from 1990. Moreover, since many structural changes occurred in the period 2000-2007, linked to technological changes and fuel shifts, it is not possible to determine how the energy system would have evolved without those changes. In this regard, fuel shifts toward low carbon fuels for electricity generation (since 1990 there has been a steady increase of natural gas share and a corresponding decrease of oil products share) as well as the introduction of combined cycle plants, since 2000, are among the most important factors that make it impossible to evaluate how the national emissions would have evolved without any measure.

## *5.2 WM scenario*

### *Main assumptions*

The WEM scenario was elaborated in 2018 and projections include all PaMs implemented or adopted up to the end of 2016. The base year for projections is 2016. The projected years are 2020, 2025, 2030, and 2035. The main assumptions of the scenario can be summarized as follow:

- GDP: economic growth from 2015 to 2020 with average annual rate of +1.37%. For the period 2020-2025 the average annual rate is +1.18%, for period 2025-2030 is +1.19%, and for period 2030-2035 is 1.50%. All average rates after 2020 are in accordance with PRIMES 2016;
- energy: reduction of energy consumption, with average annual rate of -0.35% for period 2015-2035. Increase of renewable sources toward EU 2030 targets, with average annual rate of +1.35% for period 2015-2035;
- population: increase up to 2020 with average annual rate of 0.13% since 2015, and increase up to 2035 with average annual rate of 0.34% for the period 2020-2035, quite constant for each five-years period in accordance with PRIMES 2016.

The scenario takes into account a slow recovery from the economic crisis that has hit all national activities, and it also considers the development of low carbon technologies and efficiency improvement. The main driving variables used for projections of demand for energy services in the end-use sectors, as well as for activity levels of the industrial processes, are:

- industry: gross value added (GVA) and, for some sub-sectors, physical productions;
- tertiary: GVA;
- residential: demographic trends (mainly population and number of households), increase in the number of appliances per household and growing demand for summer cooling;
- electricity generation: continuation of the ongoing growth of renewable sources;
- transport: dynamics of active population (along with assumptions about mobility per capita) and goods exchange, fleet renewal with low emissions engines.

### *General Economic Parameters*

Table 5.1 shows actual and projected values for GDP and GVA.

As already mentioned, the GDP growth is assumed from 2015 with an average year rate of +1.37% up to 2020, and +1.29% up to 2035. The GDP values for 2020 and following projected years are those provided by PRIMES 2016 for the Reference Scenario. As for value added from productive sectors a higher recovery for industry is projected as compared to services up to 2020 following the recovery from the economic crisis. In future years, tertiary sector will grow at a higher rate than industry, further increasing its role in the Italian economy.

Table 5.2 shows the energy and carbon international prices which are all following increasing trends according with the same assumption made in PRIMES2016 for the Reference Scenario.

The increase in carbon price is particularly steep during the period 2015-2030 (average annual rate 10.5%), while the foreseen growth for energy prices is much slower (average annual rate from 2.6% for oil to 4.5% for natural gas).

Table 5.1 – Actual (up to 2015) and projected GDP, and GVA

| billion € 2010<br>constant prices basis | **2010** | **2015*** | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|---|
| GDP | 1,605 | 1,557 | 1,666 | 1,767 | 1,875 | 2,019 |
| Average annual rate (%) | | -0.60% | 1.37% | 1.18% | 1.19% | 1.50% |
| GVA – industry | 245 | 244 | 268 | 276 | 286 | 300 |
| Average annual rate (%) | | -0.13% | 1.92% | 0.61% | 0.70% | 0.90% |
| GVA – tertiary | 1,063 | 1,055 | 1,126 | 1,203 | 1,284 | 1,393 |
| Average annual rate (%) | | -0.15% | 1.30% | 1.34% | 1.31% | 1.63% |
| GVA – construction | 81 | 64 | 67 | 71 | 75 | 82 |
| Average annual rate (%) | | -4.76% | 1.17% | 0.93% | 1.22% | 1.72% |
| GVA – agriculture | 28 | 29 | 29 | 29 | 30 | 30 |
| Average annual rate (%) | | 0.56% | -0.38% | 0.55% | 0.34% | 0.44% |

*2015 data are those made public by ISTAT in September 2018

Table 5.2 – Energy and carbon international prices

| | | **2015** | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|---|
| Coal prices | € 2013 / GJ | 1.8 | 2.2 | 2.6 | 3.2 | 3.4 |
| Oil prices | € 2013 / GJ | 6.0 | 7.5 | 8.1 | 8.8 | 9.4 |
| Gas prices | € 2013 / GJ | 7.5 | 11.6 | 13.2 | 14.5 | 15.1 |
| Carbon price | € 2016 / t $CO_2$ | 7.8 | 15.5 | 23.3 | 34.7 | 43.5 |

### *Population and transport*

The population grew significantly from 2005 to 2015 with annual average rate of 0.49%. The annual growth rate from 2015 to 2020 is 0.13%. Historical data up to 2015 are updated according to the last esteems of ISTAT. The average annual rate for the following years is quite stable around 0.34% up to 2030 (Table 5.3). For the period 2020-2030, the population is projected according to the average annual rate reported in PRIMES 2016.

Table 5.3 – Population

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| PRIMES 2016 | | | 61,048 | 62,065 | 63,118 | 64,229 | 64,333 |
| WEM MMR 2017 | 57,875 | 59,190 | 60,800 | 62,065 | 63,118 | 64,229 | 65,333 |
| WEM MMR 2019 | 57,875 | 59,190 | 60,796 | 61,193 | 62,232 | 63,327 | 64,416 |

The change in past years' population figures, with reference to previous submissions, is due to the last decennial Census by National Statistical Institute, published at the end of 2012, that pointed out lower population levels than those previously estimated for 2011 to about 59,365 thousand.

Table 5.4 shows data of transport demand for passengers and freights. The expected activity scenario for transport shows a steady growth from 2015 to 2030 following the recovery from the economic crisis as confirmed by data for 2015 and data up to 2018. The transport demand increases up to 2020 compared to 2015 with annual rate of 1.2% for passengers and 1.5% for goods. After 2020, up to 2030, the annual rates slow down around 0.5% for passengers and 1.0% for goods.

Table 5.4 – Transport demand for passengers and freights

| | | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| Passenger | billion pass-km | 959 | 940 | 997 | 1,011 | 1,044 | 1,067 |
| Freight | billion ton-km | 268 | 219 | 236 | 249 | 263 | 274 |

Source: Draft integrated national energy and climate plan

The next table shows the number of person per household adopted for GHG projections in residential sector. As for the average floor space, a constant value of 102.5 m2 has been used for the whole period of projections.

Table 5.5 – Inhabitants per household

| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| Inhabitants/Household | 2.42 | 2.35 | 2.33 | 2.31 | 2.29 | 2.27 |

Source: Draft integrated national energy and climate plan

### *The European context*

Italy is an EU Member State and its 2017 GHGs emissions account for about 9.9% of European Union's (EU 28) actual emissions[25]. Many mitigation policies as well as monitoring commitments are coordinated at EU level.

Under the overall commitment of 20% reduction of GHG compared to 1990 levels by 2020, concerning non-ETS, Italy is committed to reduce its emissions of 13%[26] by 2020 with respect to 2005 level under Decision n. 406/2009/EC (the so-called "Effort Sharing Decision" ESD). The emissions and removals from LULUCF sector are excluded from Effort Sharing Decision n. 406/2009/EC. More details on 2020 targets are reported in the Chapter 4.

In October 2014, the European Commission has presented a Communication on the "Climate and Energy Package 2030" to the European Council of the Head of States and Government. In the same meeting, the European Council has approved conclusions that include a quantified reduction target for the 2030 horizon. The main target set by those conclusions is the endorsement of a binding EU-wide GHG reduction of at least 40% by 2030, with reference to 1990 level. To that aim, the Council conclusions indicate that the target will be delivered collectively by the EU with the reduction in ETS and non-ETS sectors amounting to 43% and

[25] Data from CRF, year 2017, of National Inventory Submission 2019 of European Union and Italy to the UNFCCC Secretariat.

[26] ETS sectors contribute for a collective reduction of 21% of emissions compared to 2005. As also explained in Chapter 4, the ETS cap is not attributed to Member States but it's managed at EU level and declines in order to achieve the target

30% by 2030 compared to 2005, respectively. The Council Conclusions also include an EU-wide target for renewable sources of 27% and an indicative target of 27% for the energy efficiency (energy savings compared with the business-as-usual scenario). This last target will be reviewed in 2020 having in mind a 30% target.
The targets for renewables and energy efficiency at EU level were revised upwards in 2018:
- At least 32% share for renewable energy, including a review clause by 2023 for an upward revision of the EU level target.
- At least 32.5% improvement in energy efficiency, with an upward revision clause by 2023.

Following the above-mentioned Council conclusions, the European Parliament and the Council on 30 May 2018 have adopted the Regulation (EU) 2018/842 for the non-ETS sector, which requires Italy to reduce GHG emissions by 33% compared to 2005 levels within 2030. The Regulation (EU) 2018/841 on the inclusion of emissions and removals from LULUCF into the 2030 Climate and Energy Framework has been also adopted. In particular, the legislative package includes a new flexibility, which allows for a limited use of net removals from certain LULUCF accounting categories, while ensuring no debits occur in the LULUCF sectors, to account for Member State compliance towards the targets in the non-ETS sectors if needed. The cap, for Italy, is 14.5 Mt $CO_2$eq. for the entire 2021-2030 period.

As for the European monitoring and reporting mechanisms, Decision No. 525/2013/EC establishes the following commitments:

- ensuring the timeliness, transparency, accuracy, consistency, comparability and completeness of reporting by the Union and its Member States to the UNFCCC Secretariat;
- reporting and verifying information concerning commitments of the Union and its Member States pursuant to the UNFCCC, Kyoto Protocol and related decisions adopted and evaluating progress towards meeting those commitments;
- monitoring and reporting all anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol on substances that deplete the ozone layer in the Member States.

In particular, article 14 of Decision No. 525/2013/EC foresees, by 15 March 2015 and every two years thereafter, that Member States shall report to the European Commission national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks, organized by gas or group of gases (HFCs and PFCs) listed in Annex I and by sector. Those projections shall include quantitative estimates for a sequence of four future years ending with 0 or 5 immediately following the reporting year. National projections shall take into consideration any policies and measures adopted at Union level.

### *Consumption of primary and final energy*

The total primary energy supply (TPES), estimated according to the methodology adopted by Eurostat up to the end of 2018, will be about 142.7 Mtoe in 2030 with an average yearly decrease rate of -0.6% since 2015. In 2035 the projected energy supply shows a slight increase up to 145.5 Mtoe.

TPES started to decrease since 2005, before the economic crisis, while in the period 1990-2005 it has constantly increased with an annual average equal to +1.2%.

The share of natural gas increased constantly since 1990 counterbalancing the corresponding decrease of oil share. In the last years, it is also evident the growing role of renewable energies.

Figure 5.2 shows the projections of gross inland consumption according to the present submission compared to previous one and to projected consumption of Primes 2016. Relevant changes can be observed in the estimated total energy consumption between the previous projections and the last one due to updated data for base year and adoption of new measures.

Figure 5.1 – Fuel mix of TPES, historic data

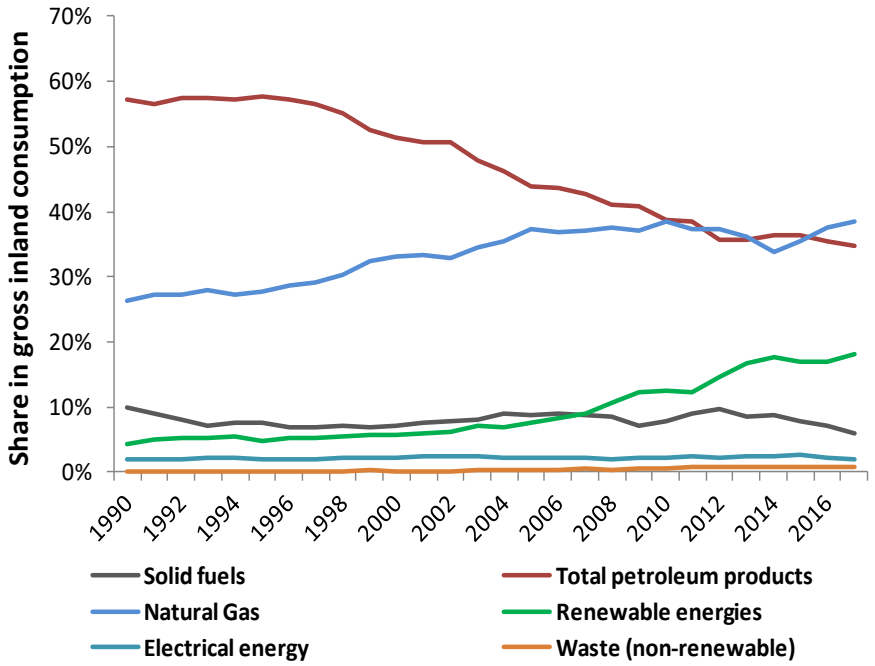
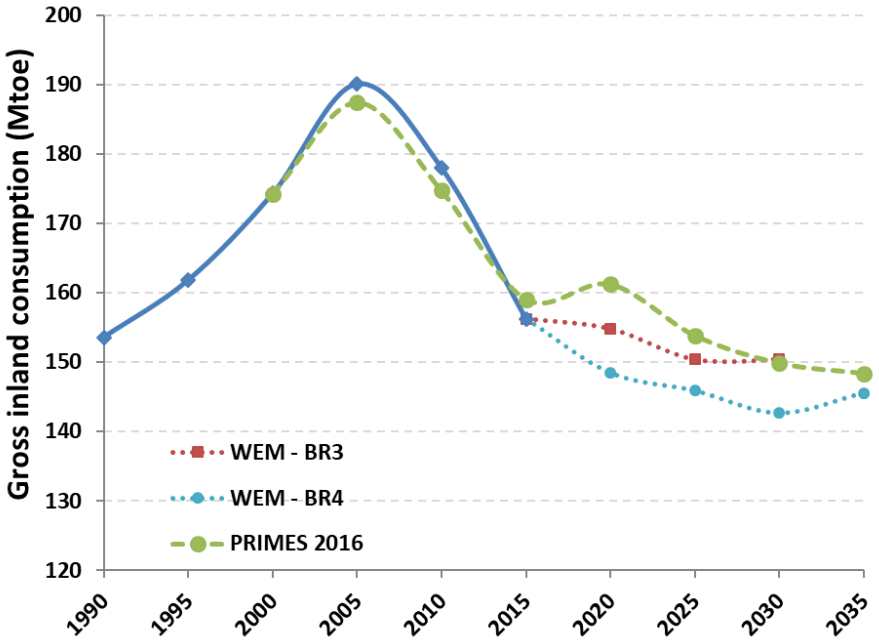



Figure 5.2 Actual and projected gross inland consumption, Mtoe




Source: ISPRA

As concerns the differences for historical years it should be noted that in 2014 ISTAT carried out a specific national survey on family energy consumption that showed much higher biomass consumption levels for domestic heating compared to previous estimates. For this reason, the whole time-series has been reviewed: for example, with regard to year 2010, biomass consumption has increased by almost 4 Mtoe, while for more distant years the increase is less than 2 Mtoe.

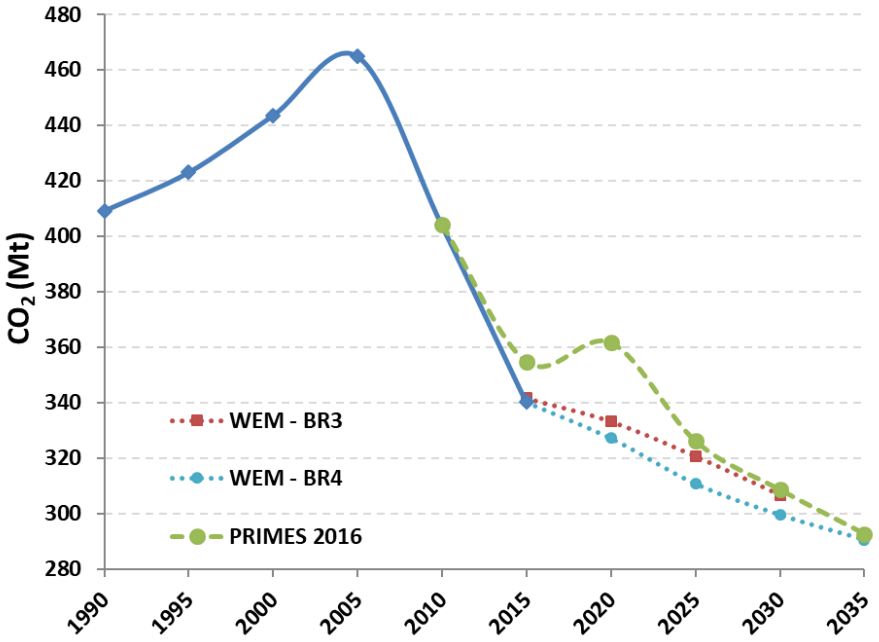
### *GHG Emissions*

Based on the above-mentioned parameters, the model jointly computes energy supply and $CO_2$ emissions, while other GHGs and non-energy GHG emissions are calculated based on the estimated evolution of activity data and emission factors. Emissions up to 2015 are inventory data as submitted to UNFCCC in 2019.

As can be seen in Figure 5.3, final results show remarkable emission reductions in 2010 and 2015, and further decrease in the next years. The reduction in emissions is due to many different factors, some of them structural and other only temporary. The most important are:

- higher than expected share of renewable in TPES, due to anticipated development of photovoltaic production and diffusion of biomass for heating;
- increased efficiency of electricity generation, with the entry into service of many combined cycle plants;
- reduced fuel consumption in transportation due to high fuel prices and low activity levels;
- sharp reduction of energy consumption in industrial sector due to the economic crisis and structural changes in production;
- increase in efficiency of final end-use devices.

Figure 5.3 – Actual and projected $CO_2$ emissions from energy sector




Note: net emission are the physical emissions in the Italian territory excluding the emission reductions due to flexible mechanism.
Source: ISPRA

Table 5.6 shows the WEM scenario projections up to 2030. Emissions are disaggregated by source of emissions sector.

Table 5.6 – WEM Scenario's GHG emissions, disaggregated by source of emission sector ($MtCO_2$ eq.)

| | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|
| ***FROM ENERGY USES, of which:*** | **425.2** | **439.4** | **459.1** | **479.7** | **418.6** | **352.8** | **340.5** | **323.5** | **311.8** | **302.9** |
| Energy industries | 137.2 | 141.7 | 149.5 | 157.5 | 136.7 | 105.8 | 92.0 | 81.7 | 81.6 | 78.1 |
| Industry | 93.2 | 91.3 | 92.2 | 87.7 | 61.6 | 51.0 | 56.4 | 55.7 | 53.4 | 52.1 |
| Transport | 102.2 | 114.3 | 123.8 | 128.4 | 115.2 | 106.0 | 103.5 | 103.8 | 96.6 | 95.8 |
| Residential and Commercial | 69.5 | 68.8 | 73.0 | 86.0 | 87.5 | 74.3 | 73.3 | 67.4 | 65.7 | 62.3 |
| Agriculture (energy use) | 9.1 | 9.6 | 8.9 | 9.3 | 8.1 | 7.7 | 7.6 | 7.5 | 7.4 | 7.4 |
| Other | 14.0 | 13.7 | 11.7 | 10.7 | 9.5 | 8.0 | 7.8 | 7.4 | 7.2 | 7.2 |
| **FROM OTHER SOURCES, *of* which:** | **92.5** | **93.1** | **95.0** | **100.9** | **87.2** | **81.2** | **78.5** | **74.8** | **71.4** | **68.6** |
| Industrial Processes + F-gas | 40.5 | 38.4 | 39.2 | 47.2 | 36.7 | 32.6 | 32.2 | 30.4 | 28.5 | 27.7 |
| Agriculture | 34.7 | 34.7 | 33.9 | 31.9 | 30.0 | 30.1 | 30.6 | 30.3 | 30.0 | 29.6 |
| Waste | 17.3 | 20.0 | 21.9 | 21.9 | 20.4 | 18.6 | 15.7 | 14.1 | 12.8 | 11.2 |
| **TOTAL** | **517.7** | **532.4** | **554.1** | **580.6** | **505.8** | **434.0** | **419.0** | **398.3** | **383.2** | **371.4** |

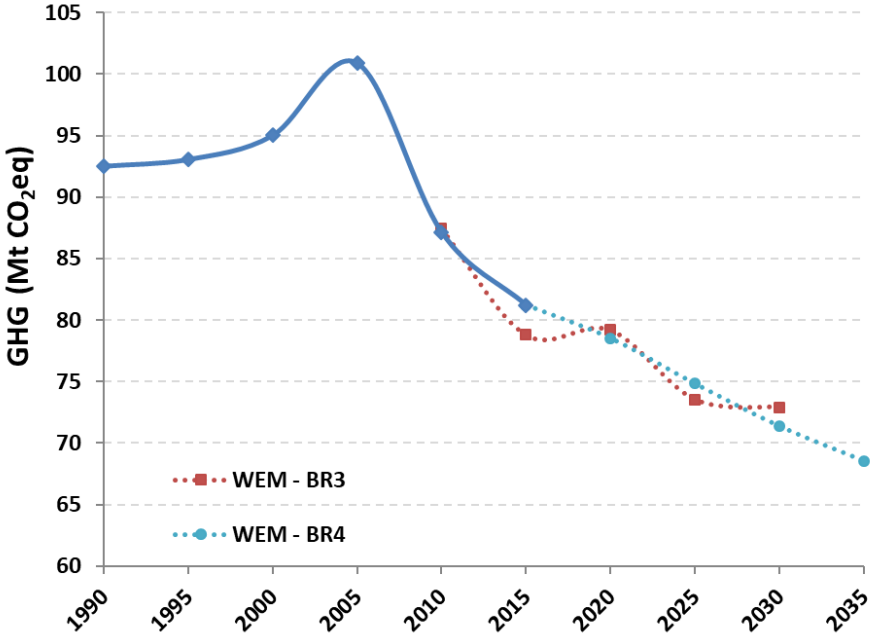
Source: ISPRA

Sector by sector analysis for the period 2015 – 2035 shows that:

- a notable shrink of emissions in energy industries is projected from 2015 to 2035 (-26.2%) mainly due to emissions reduction by power sector; in this sector, emissions are directly linked to the electricity production by fossil fuels, that outpaced the efficiency improvements up to 2008; the relevant expansion of renewable production after 2008 contributed to the emissions reduction. The emissions reduction observed in the projected years is due to further increase of thermoelectric efficiency, increase of renewable share, and fuel shift toward low carbon fuels;
- in the transport sector, the projected emissions will decrease by 10.1% from 2015 to 2035 as results of implemented measures, notwithstanding the increasing transport demand;
- civil sector shows a relevant decrease of emissions in the period 2015-2035 (-15.9%) mainly due to the efficiency increase of buildings; the emissions increase in the past is mainly linked to the expansion of services and residential building stock (second and third houses); increased house size and higher indoor temperature played an important role. In projection years, planned policies have a significant effect and are successful in curbing emissions;
- industrial emissions register a deep decrease in the period 2005–2015 (-41.9%); this reduction is due in part to the contraction of economic activities and in part to the structural change and increase of efficiency, whose effects can be seen in the projected emissions too. Indeed, in the period 2020-2035 industrial emissions show a decreasing trend with increasing GVA;
- emissions from waste sector show the highest rate of reduction from 2015 to 2035 (-39.6%) mainly due to the decrease of waste disposal in landfills.

In Figure 5.4 the emissions of $CO_2$ from non-energy sectors and other GHGs ($CH_4$, $N_2O$, and $NF_3$) from energy and non-energy sectors are reported. It can be noted that emissions reduction was sharp between 2005 and 2015. According to the scenario, the projected emissions will further decrease by 15.6% from 2015 up to 2035. The overall trend is the result of emissions reduction for all sectors.

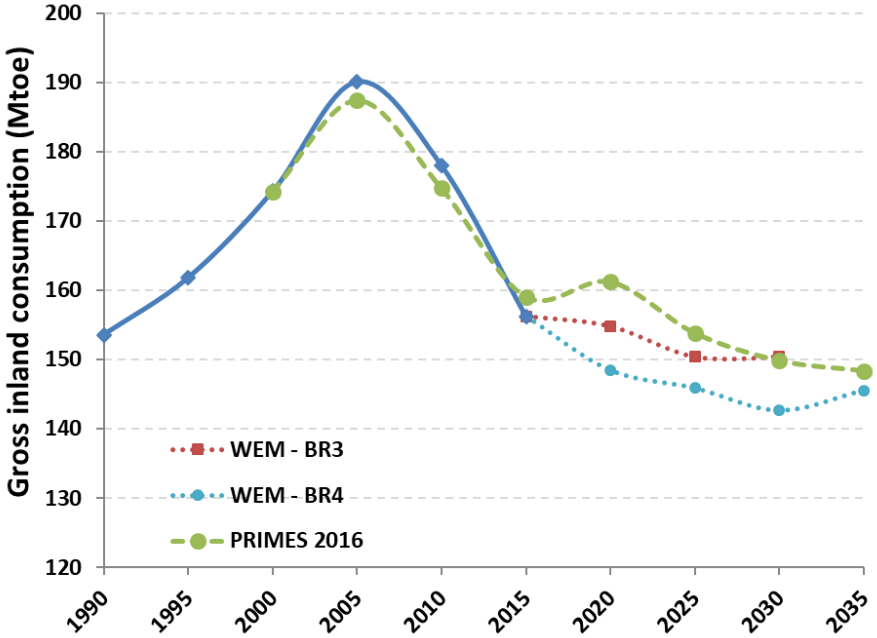
Figure 5.4 – Actual and projected emissions of $CO_2$ from non-energy sectors and other GHGs from energy and non-energy sectors.




Source: ISPRA

Figure 5.5 shows the resulting trend in total GHGs emissions. The current WEM scenario is compared with the ones reported in previous Biennial Report.

Figure 5.5 – Actual and projected GHG emissions (Mt $CO_2$ eq.)




Source: ISPRA

Table 5.7 reports emissions by gas expressed as $CO_2$ eq. $CO_2$ emissions represent about 84% of total emissions. It is worth noting the sharp reductions of methane, HFCs, and $SF_6$ emissions in the period 2015-2035, amounting to 17.4%, 49.9% and 39.5% respectively. As previously noted, the emissions contraction registered by methane is mainly due to the waste sector. The decreasing emissions of HFCs and $SF_6$ are mainly due to the implementation of the European Regulation n. 517/2014 on F-gases.

Table 5.7 – WEM Scenario's GHG emissions from 1990 to 2030, disaggregated by gas ($MtCO_2$ eq.)

| | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|
| $CO_2$ | 439.6 | 451.4 | 470.3 | 494.5 | 426.4 | 355.8 | 343.3 | 327.5 | 316.9 | 308.9 |
| $CH_4$ | 48.3 | 50.4 | 50.8 | 48.3 | 46.9 | 43.8 | 41.8 | 39.8 | 38.2 | 36.2 |
| $N_2O$ | 26.1 | 27.4 | 28.4 | 27.8 | 18.8 | 17.5 | 17.9 | 17.4 | 17.0 | 17.1 |
| HFCs | 0.4 | 0.9 | 2.5 | 7.5 | 11.7 | 14.7 | 14.1 | 11.6 | 9.2 | 7.4 |
| PFCs | 2.9 | 1.5 | 1.5 | 1.9 | 1.5 | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 |
| Unspecified mix of HFCs and PFCs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| $SF_6$ | 0.4 | 0.7 | 0.6 | 0.5 | 0.4 | 0.5 | 0.3 | 0.3 | 0.3 | 0.3 |
| $NF_3$ | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL** | **517.7** | **532.4** | **554.1** | **580.6** | **505.8** | **434.0** | **419.0** | **398.3** | **383.2** | **371.4** |
| % wrt base year, 6 gases | | 2.8% | 7.0% | 12.1% | -2.3% | -16.2% | -19.1% | -23.1% | -26.0% | -28.3% |

Source: ISPRA.

### *Energy industries sector*

According to IPCC guidelines, the energy industries sector includes the electricity production from fossil fuels, refineries and the production of coke and of electricity from coal gases in integrated steel plants. Self-generated and self-consumed electricity are not included in the energy industries sector (see also chapter 3 and in particular CRF data in section 1.A.1 a-c) as they are included among industrial emissions (see also chapter 3 and in particular CRF data in section 1.A.2). The emissions from self-generated and self-consumed electricity were relevant in the past, but in recent years they only amount to about 10% of emissions from total electricity production, as reported in the NIR[27].

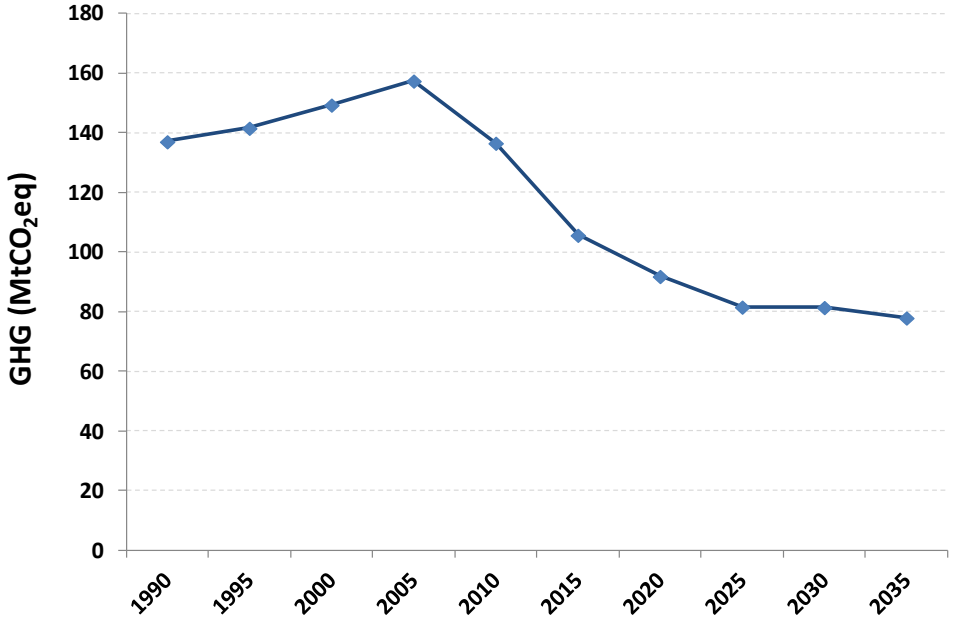
The emissions from refineries are relevant but the lower consumption of fossil fuels in the transport sector foreseen in the next years will reduce the refineries activity. Moreover, the production of coke only accounts for small quantities of emissions, so the projected emissions from the energy industry sector are mainly linked to electricity production.

As shown in Figure 5.6, between 1990 and 2005 a noticeable increase in emissions of 14.8% has been registered by the energy industries sector, about 1% yearly. From 2005 to 2015, emissions sharply decreased at an average annual rate of -3.9%. The declining trend in the last years is mainly driven by a reduced activity in the years of economic crisis and an increasing share of renewable sources to produce electricity. A significant role is also played by increasing fossil fuels efficiency for electricity generation. A further decrease of emissions is expected in the period 2015-2035 with an annual average rate around -1.5%. The reduction is due to increasing share of renewable sources for electricity generation, lesser

[27] See Annex 2 and table A2.3 of National Inventory Report 2017, ISBN 978-88-448-0822-8 - ISPRA, 2017 http://www.isprambiente.gov.it/it

contribute is expected by efficiency factor due to limited scope remaining for technologies to increase the energy generation efficiency and for fossil fuel switch to gas.

Figure 5.6 – Energy industries actual and projected GHG emissions (Mt $CO_2$ eq.)



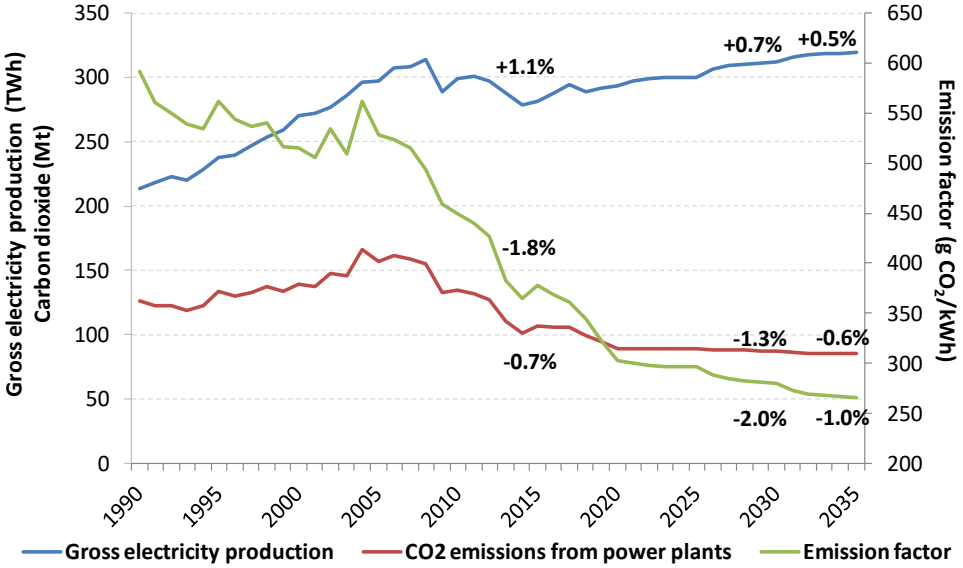

Source: ISPRA

### *Electricity production*

Data considered in this paragraph concern all electricity generation plants, including those plants usually dedicated to the supply of electricity and heat to sectors different from 1.A.1.a (Public electricity and heat production).

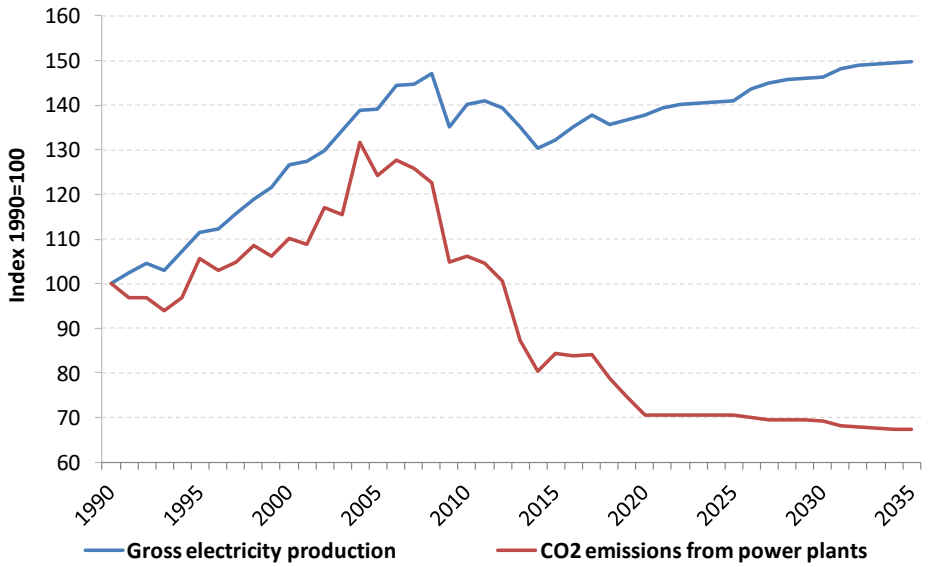
Historical data show a decoupling between $CO_2$ emissions from power plants and electricity production (Figure 5.7 and Figure 5.8). Since 1990, the electricity production increased constantly up to 2008 with an average annual rate higher than $CO_2$ emissions. The average growth rate of gross electricity production amounted to 2.2% per year from 1990 to 2008, doubling the growth rate of $CO_2$ emissions (1.1% per year) and thus showing a relative decoupling for the two parameters. From 2008 to 2014, the electricity production dropped down for the economic crisis (-2.0% per year for gross electricity production and -6.8% per year for $CO_2$ emissions). In the same period, it is evident how the decoupling between electricity production and $CO_2$ emissions becomes absolute as respective trends continue diverging. Such effect is mainly due to the sharp development of renewable sources in the period. Data for the last years up to 2017 show the increase of electricity production as result of economy recovery from the long financial and economic crisis that hit the national system.

Figure 5.7 – Electricity production and $CO_2$ emissions




Source: ISPRA

Figure 5.8 – Electricity production and $CO_2$ emissions relative trends on 1990



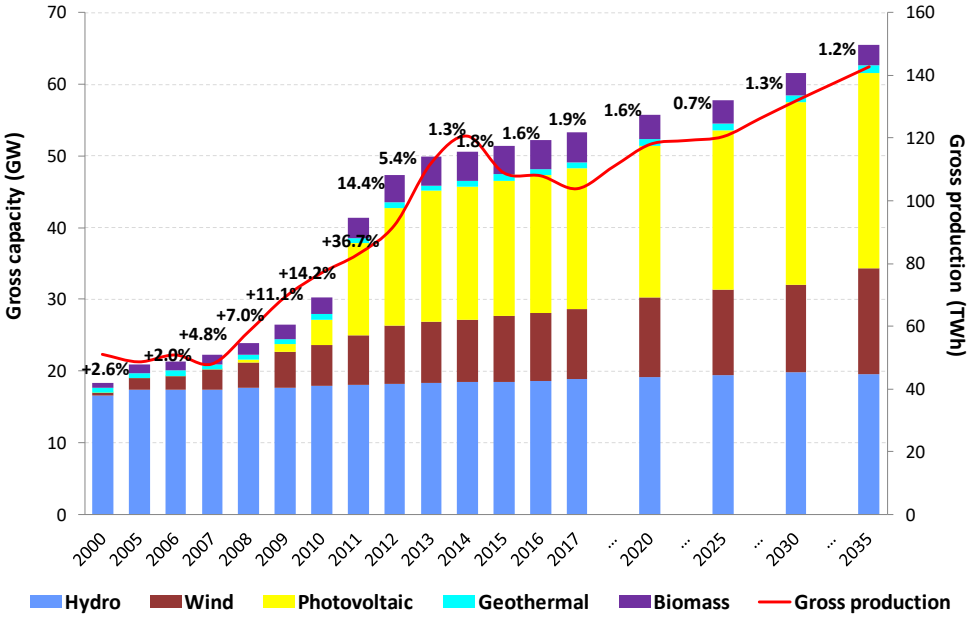

Source: ISPRA

The decoupling between electricity generation and atmospheric emissions, particularly evident since 2004, is mainly due to fuel shift toward lower carbon content fuels, and to a relevant increase in electricity production efficiency. Since 2007, the increasing share of renewable sources was the most relevant factor contributing to the decoupling trend (Figure 5.8).

According to WEM scenario, the expected increase in electricity demand will be covered by a strong increase in installed renewable sources power. The installed capacity in 2017 was 53.3 GW, with an average growth rate of 5.2% per year from 2000 to 2010 and of 8.4% per year in the following years up to 2017. From 1990 to 2008, hydropower was the most relevant renewable source; after 2008, other sources have become more and more relevant. Since 2013, the annual rate of new installed capacity has shown a slowdown,

while the electricity production has registered a downturn mainly due to the sharp reduction of hydropower share (Figure 5.9). The installed renewable capacity projected for 2030 and 2035 are about 58 GW and 62 GW respectively, mainly due to the increase of photovoltaic and wind.

Figure 5.9 – Renewable contribution to gross electricity production




Source: ISPRA

Total gross efficient power capacity, including renewables, increased from 102.3 GW in 2008 to 128.6 GW in 2013, with a renewable share of 23.3% and 36.8%, respectively. Since 2008, renewable power represents the main component of new installations (26.1 GW out of 26.3 GW). Starting from 2011, a growing decommissioning of thermal capacity has been registered (about 17 GW). In 2017, the gross efficient power capacity is 117.1 GW with 45.5% being from renewables.

The growth of renewable share has been mostly affected by photovoltaic and wind capacity. As concerns the electricity generation from renewable sources, the 2020 target assigned to Italy under European commitments is 26.4%, expressed as percentage of renewables on gross final consumption of electricity, including the import share of electricity. Such target is overachieved since 2011, and the 2017 share of renewables was 34.1% of gross final consumption of electricity[28].

In calculating the contribution of hydropower and wind, the effects of climatic variation are smoothed through the use of a normalization rule according to Directive 2009/28/EC. The increase of renewable electricity production is foreseen to continue in the next years. Projections show that renewable electricity production will amount to about 132 TWh in 2030 and 142.9 TWh in 2035, out of total generation figures of 312.1 and 319.2, respectively.

### *Refinery sector*

The level of activity of this sector is strictly linked to the activity of the transport sector (82% of final energy consumption of total petroleum products in 2015) whose energy needs still rely mainly on oil products.

[28] GSE, 2018 – Energia da fonti rinnovabili in Italia – Anno 2017.

During the past decade, under the economic crisis, the transport sector has been heavily affected, thus leading to a reduction of the activity of refineries too, which also led to a reduction of the number of operating plants.

An upward trend in emission levels was observed from 1990 to 2010 explained by the increasing quantities of crude oil processed and by the complexity of processes used to produce more environmental friendly transportation fuels and to reduce the production of residual fuel oil. The increase in complexity resulted in an increase of energy consumption with the installation of deep conversion units or integrated gasification units, that can use heavy residuals to produce electricity, heat and hydrogen.

Liquid fuel consumptions have reached a plateau in 2010 and are now in a downward trend that is expected to continue, due to the reduced quantities of crude oil processed and of electricity produced, and to the gradual substitution of oil products with natural gas in the civil and industrial sectors, and with gaseous fuels, biofuels and electricity in the transport sector.

### *Final uses of energy*

The next table reports historical data and projections for final uses of energy according to Eurostat methodology.

Table 5.8 – Final energy consumption (Mtoe)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **Total final uses** | 137.2 | 128.5 | 116.2 | 116.4 | 115.1 | 113.2 | 113.8 |

Source: Draft integrated national energy and climate plan

The scenario shows a quite stable value for final energy consumption after 2015, following the slow recovery trend from the economic crisis and the increasing efficiency.

Comments to data are provided in the sector-by-sector analysis.

### *Industry sector*

According to CRF section 1.A.2, the industrial sector considered herein includes manufacturing industries and construction. In this paragraph emissions connected to energy use are considered, excluding process emissions reported in section 2.A-C of CRF.

The next table reports the projections for final energy consumption in industry (Mtoe) for WEM scenario, while the emission trend is reported in Figure 5.11.

Table 5.9 – Final energy consumption in industry sector (Mtoe)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **Industry** | 39.9 | 31.3 | 25.8 | 26.5 | 26.6 | 26.0 | 26.1 |

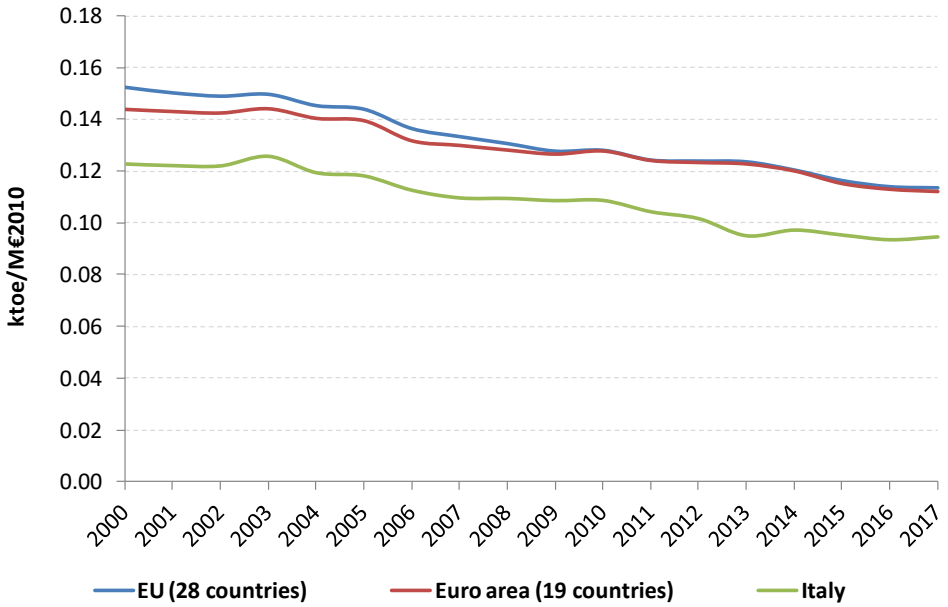
Source: Draft integrated national energy and climate plan

A primary tool to reduce the emissions of greenhouse gases is by improving the level of energy efficiency of the industrial processes. According to the American Council for an Energy-Efficient Economy's (ACEEE), Italy is one of the world's most energy-efficient countries[29] and stands below the average energy intensity among EU and Euro area countries. Figure 5.10 shows the energy intensity of the industrial sector calculated as the

[29] ACEEE, 2018- The 2018 International Energy Efficiency Scorecard.

ratio between the final consumption in industry sector for energy and non-energy use and the GVA for Industry and Construction estimated according to latest Eurostat methodology updated on January 2019.

Figure 5.10 – Energy intensity of industrial activities in Italy and EU




Source: ISPRA on EUROSTAT data

The industrial sector has gone through a period of consumption reduction, driven by the economic crisis but also by improvements of industrial activities, which has led to a reduction of emissions as well.

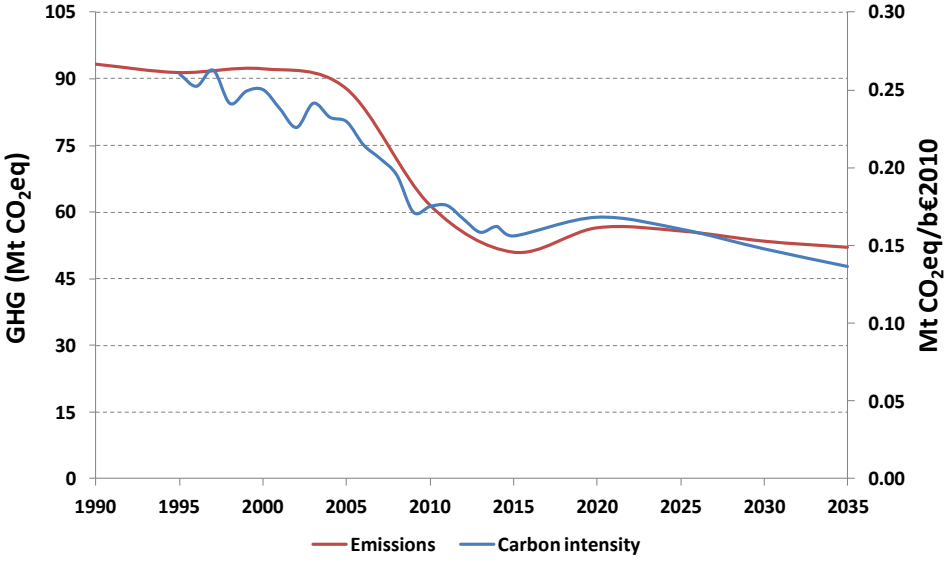
Indeed, it is essential to remark that, as shown in Figure 5.11, the carbon intensity of energy uses of industry has also decreased steeply since 1995. This shows that the observed reduction of emissions is not only due to lower consumption but also to structural changes in the sector (less energy intensive activities as mechanical, food, specialized chemicals manufacture and other light industries are playing a major role) and to the increase in efficiency.

Further improvements remain technically feasible, although they represent a challenge for those sectors that have already reached high levels of efficiency with respect to the biggest economies in the European Union, mainly for energy intensive subsectors as steel, cement, tiles, paper. Those subsectors are included in the EU–ETS and international competition concerns are addressed at the EU level, with the evaluation of the possibility of "carbon leakage" and the adjustment of emission allowances prices for sectors involved.

Figure 5.11 shows GHG emissions from energy consumption in industry and the carbon intensity of the sector.

Compared to energy intensity, carbon intensity has decreased steeply due to the change in industrial structure and fuel mix, where natural gas, electricity and derived heat have increased their shares. For the projected years, further fuel switches from more carbon intensive fuels to natural gas are unlikely. Future improvements are mainly expected from moderate increases in efficiency and electrification of activities.

Figure 5.11 – Trends of GHG emissions and carbon intensity for industry sector




Source: ISPRA

### *Transport sector*

In conformity with the IPCC Guidelines, the transport sector includes road and railway transportations, domestic air traffic, the national amount of international air flights (landing and take-off) and coastal navigation, as well as the consumptions in the harbour from ships travelling in international voyages.

The next table reports historical data and projections for final use of energy. Starting from 2015, energy consumption will decrease up to 2030 with average annual rate of -0.26% per year.

Table 5.10 –Final energy consumption in transport sector (Mtoe)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **Transport** | 44.8 | 41.7 | 39.5 | 39.3 | 39.0 | 38.0 | 37.7 |

Source: Draft integrated national energy and climate plan

GHGs emissions from this sector registered a strong historical growth from 1990 to 2007 (+26.7%). Following the economic downturn, the trend has changed direction registering a reduction of 18.1% in the period 2007-2015. The declining trend of the sector is confirmed up to 2017 (-6.2% wrt 2015). Projected emissions are expected to slightly decline up to 2025. After 2025 up to 2035, emissions reduction of 7.8% is expected.

Road transport accounts for almost the totality of sector emissions (93.6% in 2015). Passenger transport is responsible for about 64% of emissions, while goods and other fuel-uses (Public administration, fisheries) account for the balance. Notwithstanding the increase of transport demand, both for passengers and for freights, the projected emissions will be quite stable. This outcome is due to the effects of the following planned measures:

- efficiency gain and emissions targets, including the development of low consumption vehicles (preliminary estimation of the impact on $gCO_2$/km emissions of future regulation on new passenger cars, with target of 95 $gCO_2$/km for the years since 2020; average $CO_2$ emissions for new light duty vehicles, LDV, of 175 $gCO_2$/km since 2017 and 147 $gCO_2$/km since 2020);
- increase of electric vehicle fleet from near zero in 2015 to about 4-5 million in 2030;
- modal optimization: car sharing, car pooling and shared taxi initiatives for passenger transport;

- infrastructures: extension and modernization of the local railway network.

The modal split is foreseen to remain substantially unchanged up to 2020 for passengers, whereas a significant increase in railway / ship goods transport is expected. From 2020 to 2030, an increase of passenger-km in railway and public transport is foreseen.

Table 5.11 shows historical and projected emissions related to fuels sold to ships and aircrafts for international transport. For international aviation, emissions are expected increase after 2015 (+47% in the period 2015-2035). The same trend is foreseen for international maritime transport, projected emissions show a steady increase up to 2035 (+45.5% since 2015).

Table 5.11 – Emissions from international bunkers (Mt $CO_2$ eq).

| | 1990 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|---|
| **Aviation** | 4.3 | 8.6 | 8.9 | 9.7 | 12.3 | 12.8 | 13.0 | 14.2 |
| **Marine** | 4.5 | 6.9 | 7.0 | 5.6 | 6.9 | 7.2 | 7.7 | 8.1 |

Source: ISPRA

### *Civil and agricultural sectors*

The next table reports historical data and projections for energy final consumption in civil and agriculture sectors.

Table 5.12 – Final energy consumption in civil sector (Mtoe)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **Services** | 15.1 | 17.0 | 15.4 | 15.7 | 15.7 | 15.7 | 16.6 |
| **Residential** | 33.9 | 35.4 | 32.5 | 32.0 | 30.9 | 30.5 | 30.5 |
| **Agriculture** | 3.5 | 3.1 | 3.0 | 2.9 | 2.9 | 2.9 | 2.9 |

Source: Draft integrated national energy and climate plan

The sectors are characterized by the following features:

- agriculture: moderate penetration of gas in the agricultural sector results in slight decrease of $CO_{2eq}$ emissions from energy uses (from 7.7 Mt in 2015 to 7.4 Mt in 2035);
- buildings (residential and tertiary): the main driver in the residential sector is the increase of families, while for services the main driver is the value added. It is expected a slight yearly increase of total square meters for buildings, both residential and services. The increase in heating demand will be offset by the estimated natural gas expansion, by higher electricity penetration, and by the expected efficiency gains according to the National Plan for Energy Efficiency and minimal standards for buildings. As for building renovations, an annual average rate of 0.37% has been considered. Such effects will result in $CO_{2eq}$ emission reductions (from 74.3 Mt in 2015 to 62.3 Mt in 2035). The scenario takes into account the dynamic of degree days as in PRIMES 2016.

The residential sector shows a decrease of energy consumption from 2015 to 2035 (-6.1%), while services consumption will increase over the same period (+7.9%). The share of energy consumption by services in the civil sector is expected to grow steadily from 32.1% in 2015 to 35.2% in 2035.

### *5.3 Emissions from other sectors*

In Figure 5.4, GHG emissions from non-energy sectors are reported. As can be noted, a sharp emissions reduction is registered between 2005 and 2015. This reduction is due to the effect of the following factors (in order of importance):

- implementation on $N_2O$ emission control in the adipic acid and nitric acid production;
- reduction of emissions from landfills due to increased recovery of methane;
- reduction of other process emissions due to a reduction of related industrial production;
- increase of recovery of animal wastes for biogas production.

According to the scenario, projected emissions are to remain quite stable in the period 2015-2020 and to show further slightly decreases from 2020 onward. The overall trend represents the combination of different evolutions of the underlining sectors and gases, in particular a stable trend in emissions from solvent, agriculture and industrial processes and a sizeable reduction of emissions from the waste sector.

#### *Projections of emissions from industrial processes*

Emission projections for industrial processes rely on the same main assumption on GVA and physical production used for the calculation of final energy consumption of the industrial sector. Information directly communicated from industry has been used for aluminium production and for F-gases production and consumption. For $SF_6$ used in magnesium and aluminium foundries and for solvent and other product use, future trends have been estimated extrapolating most recent data and considering the implementation of the European Regulation n. 517/2014 on F-gases (F-gases Regulation), the European Directive 2010/75/EC (Industrial Emissions Directive) for the provisions concerning the reduction of VOC emissions due to the use of solvent and the European Directive 2004/42/EC on the limitation of emissions of VOC due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products (Deco Paint Directive).

The scenario includes the reduction of $N_2O$ emissions from the nitric acid production obtained with the adoption of the most advanced technologies to be applied to the main existing nitric acid production plants by 2015 (installation of selective catalytic reduction systems for the treatment of process gases).

For the other categories, emission factors have been considered constant for the whole time series assuming that no further additional measures will be implemented. Emission estimates consider the six direct greenhouse gases under the Kyoto Protocol ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, $SF_6$) plus nitrogen trifluoride ($NF_3$) which contribute directly to climate change owing to their positive radiative forcing effect. The resulting GHGs emission scenarios by sector and by gas up to 2035 are reported in Table 5.13. The stability of industrial processes emissions is connected to the increase, following the economic crisis, of industrial production in mineral industry, compensated by the decreasing use of substitutes of ozone depleting substances, the other emissions being stable.

Table 5.13 – Emission scenario by sector from industrial processes and solvent use ($MtCO_2$ eq.)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **Total Industrial Processes** | 47.2 | 36.7 | 32.6 | 32.2 | 30.4 | 28.5 | 27.7 |

Source: ISPRA

The scenario includes the reduction of $N_2O$ emissions from the nitric acid production already obtained with the implementation, by 2015, of the most advanced technologies at the main existing nitric acid production plants (installation of selective catalytic reduction systems for the treatment of process gases).
For the other categories, emission factors have been considered constant for the whole time series assuming that no further additional measures will be implemented. Emission estimates consider the six direct greenhouse gases under the Kyoto Protocol ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, $SF_6$) plus nitrogen trifluoride ($NF_3$) which contribute directly to climate change owing to their positive radiative forcing effect. The resulting GHGs emission scenarios by sector and by gas up to 2030 are reported in Table 5.14 and in Table 5.15, respectively. The stability of industrial processes emissions is connected to the increase, following the

economic crisis, of industrial production in mineral industry, compensated by the decreasing use of substitutes of ozone depleting substances, the other emissions being stable.

### *Projections of emissions from the agriculture sector*

GHG emissions figures from the agriculture sector are updated and improved thanks to different national research studies[30]. Methodologies for the preparation of national inventories under the Convention on Long-Range Transboundary Air Pollution and the United Nations Framework Convention on Climate Change are kept consistent[31].

Between 1990 and 2015, GHGs emissions from the agriculture sector have decreased by 13.0%. Emission trends are due to the reduction in activity data such as the number of animals, the cultivated surface and crop production and use of nitrogen fertilizers, and the changes in manure management systems, mainly linked to Common Agricultural Policy (CAP) measures[32]. Emission projections are estimated with the same model used for the preparation of the national emission inventory. To estimate the number of different animal categories, a model has been developed by ENEA[33] and information is updated every year[34]. For the use of fertilizers, ENEA assumptions are based on the European Fertilizer Manufacturers Association (EFMA) forecast. For the surface and agricultural production, a trend has been estimated on the basis of the 1990-2015 time series.

In Table 5.14, the assumptions adopted for fertilizers consumption are shown. A decrease of 21.8% of total consumption of nitrogen synthetic fertilizers has been estimated in 2020 with respect to 2005. From 2020 onwards, data are assumed to be constant since no other information is available.

Table 5.14 – Assumptions used for estimating GHG emission projections from fertilizers consumption

| **Fertilizers (kt nitrogen*)** | **2005** | **2015** | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|---|
| N input from application of synthetic fertilizers | 779.85 | 517.85 | 610.21 | 610.21 | 610.21 | 610.21 |
| N input from application of manure | 453.72 | 451.88 | 462.14 | 481.35 | 487.35 | 482.21 |
| N fixed by N-fixing crops | 176.70 | 165.62 | 156.96 | 153.35 | 148.87 | 145.60 |
| N in crop residues returned to soils | 209.83 | 176.71 | 144.75 | 134.97 | 133.29 | 131.67 |
| **Total consumption of N fertilizers** | 1,620.1 | 1,312.1 | 1,374.1 | 1,379.9 | 1,379.7 | 1,369.7 |

* Nitrogen content in synthetic fertilizers

Source: ISPRA

In Table 5.15, assumptions for the main animal categories (cattle, swine, sheep and poultry) are shown. The CAP 2014-2020[35] agenda, such as the milk quota reform, will lead to revise these estimates in the next future.

[30] NIR 2017, Chapter 5 - ISPRA, Report 261/2017 http://www.isprambiente.gov.it/it/pubblicazioni/rapporti/italian-greenhouse-gas-inventory-1990-2015.-national-inventory-report-2017

[31] ibidem

32 Rural Development Plans (RDPs) from Italy are available at URL: https://ec.europa.eu/agriculture/rural-development-2014-2020/country-files/it_en

[33] ENEA, 2006. Valutazione del potenziale di riduzione delle emissioni di ammoniaca. Rapporto Finale. ENEA UTS- PROT, Unità Inquinamento Atmosferico. Settembre 2006.

[34] D'Elia et al., 2008. Nitrogen related research and policy activities in Italy: The Ammonia experience in Italy. Presentation Task-force on Reactive Nitrogen, Wageningen, 21 – 23 Maggio 2008. Updated scenarios are available at the link http://gains-it.bologna.enea.it/gains/IT/index.login.

[35] On 26 June 2013 the Commission, the Council and the European Parliament reached a political agreement on the reform of the CAP 2014-2020.

Table 5.15 – Assumptions used for GHG emissions projections with respect to the number of animals

| Animal category (kheads) | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| Dairy cattle | 1,842 | 1,746 | 1,826 | 1,653 | 1,642 | 1,631 | 1,610 |
| Non-dairy cattle | 4,410 | 4,086 | 3,955 | 4,090 | 4,057 | 3,970 | 3,782 |
| Swine | 9,200 | 9,321 | 8,675 | 9,526 | 9,596 | 9,693 | 9,700 |
| Sheep | 7,954 | 7,900 | 7,149 | 7,861 | 7,934 | 7,985 | 8,018 |
| Poultry | 188,595 | 198,347 | 196,387 | 201,310 | 204,378 | 205,590 | 204,740 |

Source: ISPRA

In Table 5.16, GHG emissions projections by source category are shown. After an initial decrease in the period 2005-2010, emissions are estimated to remain constantly around 30 Mt. The main drivers for GHG emissions reductions are given by agricultural soils, whose emissions mainly decreased in the period 2005-2010, and manure management whose emissions fell most in the period before 2005. GHG emissions of both these categories decrease by 12.7% in 2030 respect to 2005. These sources account for 30.4% and 19.4% of total agricultural emissions in 2005 respectively and these contributions become equal to 27.2% and 20.2% in 2015.

Table 5.16 – Emissions projections for the agriculture sector ($MtCO_2$ eq.)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **TOTAL GHGs** | 31.9 | 30.0 | 30.1 | 30.7 | 30.3 | 30.0 | 29.6 |

Source: ISPRA

### *Projections of emissions from the LULUCF sector*

The driving forces for projections are the activity data linked to the LULUCF sector; in particular, those related to *forest land* (and related activity *Forest Management*), *cropland* and *grassland* constitute the key variables to project emissions by sources and removals by sinks.

As reported in chapter 4, Italy has submitted information on Forest Management Reference Level (FMRL[36]), equal to -22,166Mt $CO_2$ eq. per year applying a first-order decay function for harvested wood products (HWP) and -21,182 Mt $CO_2$ eq. per year assuming instantaneous oxidation of HWP. According to Decision 2/CMP.7, methodological consistency between the FMRL and reporting for forest management during the second commitment period of the Kyoto Protocol has to be ensured, applying technical correction if necessary; the methodological elements triggering the need for a technical correction have been analyzed, providing a description on the detected inconsistencies and a timing for the addressing of the issue (Table 5.17).

Table 5.17 – Elements triggering a methodological inconsistency between the FMRL and FM reporting

| Criteria | Description |
|---|---|
| The method used for GHG reporting (for Forest land remaining forest land or Forest Management) changed | The FMRL has been calculated with the EU models G4M (IIASA) and EFISCEN (EFI). Estimates of emissions and removals under FM activities have been carried out with the growth model For-est, used to estimate |

[36] Submission of information on forest management reference levels by Italy:
http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_italy_2011.pdf

Communication of 11 May 2011 regarding harvested wood products value by Italy:
http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_italy_corr.pdf

| Criteria | Description |
|---|---|
| after the adoption of FMRL | the net change of carbon in the five reporting pools. |
| Forest characteristics and related management[37] | Availability of new data resulting from the ongoing NFI and consequent recalculations of the reported data under FM and *Forest Land Remaining Forest Land used* to establish the reference level. |
| Harvested wood products | The estimates have been carried out on the basis of the 2013 KP Supplement (IPCC 2014) methodology. |

The changes related to the methodological elements listed in Table 5.17 triggers a methodological inconsistency between the FMRL and FM reporting, to be addressed through a technical correction (TC). Therefore, to ensure methodological consistency between the FMRL and reporting for Forest Management during the second commitment period, the FMRL has been recalculated ($FMRL_{corr}$) in order to deduce the technical correction to the FRML. The key element is the use, in the elaboration of the $FMRL_{corr}$, of the same model used in the FM reporting (i.e. the For-est model); in addition the latest available activity data (i.e. forest areas, harvest statistics, fires occurences) have been used and the HWP have been estimated following the 2013 KP Supplement (IPCC, 2014) methodology. The resulting $FMRL_{corr}$ and the related technical correction is provided in the following Table 5.18.

Table 5.18 Techical correction and FMRLcorr

| | Emissions and removals (Gg $yr^{-1}$) |
|---|---|
| FMRL | -22,166 |
| $FMRL_{corr}$ | -23,846 |
| difference in % | 8% |
| Technical Correction | -1,680 |
| Accounting Parameter | 23,846 |

In table 5.19, projections for LULUCF categories have been reported. These projections have been carried out on the basis of 1990-2017 trend, subcategory by subcategory and have been officially reported under Article 3(2) of the Monitoring Mechanism Decision (Commission Decision 280/2004/EC).

Table 5.19 – Projections for LULUCF categories (Gg CO2 eq.)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| **LULUCF** | **-28,383** | **-39,379** | **-25,980** | **-22,767** | **-23,429** | **-26,228** | **-28,383** |
| Forest land | -34,477 | -39,922 | -27,519 | -23,075 | -22,749 | -24,382 | -34,477 |
| Cropland | 1,459 | 2,160 | 1,059 | 975 | 891 | 806 | 1,459 |
| Grassland | -2,643 | -6,926 | -4,341 | -4,478 | -4,785 | -5,096 | -2,643 |
| Wetlands | 8 | 130 | 167 | 230 | 292 | 355 | 8 |
| Settlements | 7,801 | 4,956 | 4,561 | 3,902 | 3,244 | 2,585 | 7,801 |
| Other Land | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Harvested wood products | -531 | 223 | 93 | -321 | -321 | -497 | -531 |

Source: ISPRA

[37] This includes, among others: age-class structure, increment, species composition, rotation lengths, management practices, etc.

Under the WM scenario, existing policies affecting cropland and grassland categories have been considered to remain in place until 2020;. Therefore, in this scenario the future mix of agronomic and financial measures remains constant on the same total of hectares provided to national and regional levels in the programming period 2007-2013. The land uses trend has been assessed, in a ten-year period, on the bases of historical trends but also considering the proposed legislation at the national level on the containment of land consumption, i.e. a constant increase of forest area till 2030 a 2% reduction of cropland areas and a 5% reduction of grassland areas have been assumed in a.Future developments of emission and removal projections for subsectors under LULUCF are expected, considering the EU governance framework and the incoming 2030 target. In this view and in the framework of the reporting and accounting under EU Decision 529/2013, data activity projections were assessed taking into account the different management practices[38]. Detailed information on the assumptions and the quantitative assessment of scenarios considering different paths then those reported in the current WM scenario may be found in the Italian Progress report on LULUCF action under the art. 10.2 of Decision 529/201[39].

### *Projections of emissions from the waste sector*

The following projections have been prepared in conformity with most recent inventories and evaluations on the implementation of mitigation measures. The driving forces for projections estimations are especially activity data linked to the whole waste sector and the reduction of biodegradable waste in landfills. In particular, the municipal waste cycle has been studied, analysing its evolution through the years on the basis of actions that have already been put into effect.

The total amount of annual waste production has been estimated on the basis of official population forecasts provided by the National Institute of Statistics (ISTAT). Starting from the production, waste fluxes have been analysed on the basis of the following waste management options: recycling, landfilling, incineration, mechanical biological treatments and composting.

Focusing on recycling and other options, national circumstances turn out being very different from northern to southern regions. Many northern cities have already reached and exceeded their fixed target, whereas some southern regions are lagging behind in complying with national targets for separate collection, although significant improvements have been made over the last few years allowing to reach 47.5% for separate collection in 2015. Governmental efforts aimed to the improvement of waste management lead to an optimistic outlook for the fulfilment (52.5% of separate collection in 2016, 54.6% in 2017), by the deadlines, of the commitments for reuse and recycling set up by the current legislation (50% by weight within 2020 - Directive 2008/98/EC).

Table 5.20 – Emissions for the waste sector ($MtCO_2$ eq.)

| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| Total waste sector | 21.9 | 20.4 | 18.6 | 15.7 | 14.1 | 12.8 | 11.2 |

Source: ISPRA

Regarding landfills, the total amount of waste disposed into landfills will vary according to the actual trend, whereas the composition of waste has varied as a consequence of the compliance with the separate collection target. Notwithstanding, the amount of biodegradable waste disposed into landfills is not totally complying with the target of landfill directive (D.lgs. 36/2003) resulting in 121 $kg_{waste}$/inh.*year rather than 115 $kg_{waste}$/inh.*year. The share of landfill gas collected will reach 60% in 2028.

Furthermore, from 2010, each municipal waste incinerator is equipped with an energy recovery system and only industrial waste could still be treated without energy recovery. Emissions from incinerators with energy recovery are reported in the energy sector, while emissions from incinerators without energy recovery are

[38] The following management practices have been considered: *organic farming, sustainable agriculture, conservation practices, set-aside, ordinary agriculture, ordinary grazing land, managed grazing land, improved grazing land.*
[39] Italian Progress report on LULUCF action under the art. 10.2 of Decision 529/2013: http://cdr.eionet.europa.eu/it/eu/mmr/lulucf/envwm_kbq/ITALY_Progress_report_on_LULUCF_Article_10_2__of_dec_529_update_2016.pdf/manage_document

reported in the waste sector. The total amount of waste incinerated will increase in line with the current trend. Finally, the amount of waste treated in Mechanical biological treatment plants will increase in line with the strategy to pre-treat waste in order to obtain a bio-stabilized product to dispose to landfills and a dry-fraction to burn in waste-to-energy facilities. As a consequence of this waste cycle projection, biological waste treated in composting and anaerobic digestion plants will also increase following the trend up to 2035. According to these projections, a 40% reduction can be expected in 2035 with respect to 2015 in overall greenhouse gas emissions from the waste sector, expressed in terms of $CO_2$ equivalent, essentially as a result of a reduction in methane emissions from landfills.

### *5.4 Projection results and emissions targets*

Table 5.21 summarizes the GHG emissions up to 2035, together with the EU targets, divided by ETS and non–ETS sectors. Considering emissions levels according to the WEM scenario (line "Non-ETS sector" and "ESD/ESR targets" in the table) 2015 and 2020 targets are expected to be achieved, while there is a sizeable distance from the 2030 provisional target set to -33% wrt 2005 level.

Table 5.21 – National GHGs emissions and European targets (Mt $CO_2$ eq.)

| | **1990** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|---|---|---|
| National emissions | **517.7** | **580.6** | **505.8** | **434.0** | **419.0** | **398.3** | **383.2** | **371.4** |
| ETS sectors | | 247.5 | 199.5 | 156.2 | 148.5 | 138.0 | 136.5 | 133.8 |
| Non-ETS sectors (ESD/ESR) | | 330.2 | 303.3 | 275.6 | 268.1 | 258.0 | 244.4 | 235.3 |
| Civil Aviation | | 2.8 | 3.0 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 |
| ESD/ESR targets* | | | | 304.2 | 291.0 | | 221.2 | |
| Gap | | | | -28.6 | -22.9 | | +23.2 | |

* Target has been set up to 2020 by the Effort Sharing Decisions (ESD) 406/2009/EC, while the 2030 target is set up according to Effort Sharing Regulation (ESR) 2018/842. The emissions target for 2020 is set to -13% wrt 2005 level. The provisional emissions target for 2030 is set to -33% wrt 2005 level. NF3 emissions are included into the ESR target for the post-2020 period.

Source: ISPRA

### *5.5 WAM Scenario*

The WAM scenario was elaborated with the same main assumptions and base year adopted for WEM scenario and considering the targets set up for final energy consumption and renewable share in the first draft integrated national energy and climate plan.

The national efficiency target to be achieved in 2030 is set to -0.8% per year of final energy consumption, while the renewable share target is set to 30% of final energy consumption in 2030.

The draft plan also provides a preliminary list of planned PaMs aiming to reach the targets.

As stated in the introduction, in the forthcoming months the draft national plan will be submitted to an extensive public consultation and Strategic environmental assessment (SEA) that will help refining data, targets and policies and measures, also considering the national air pollution control program under the new National Emissions Ceilings Directive (2016/2284/EU).

The present WAM scenario is based on the draft national plan provided in December, but, due to the processes that are in place, emission projections as well policies and measures are likely to be updated

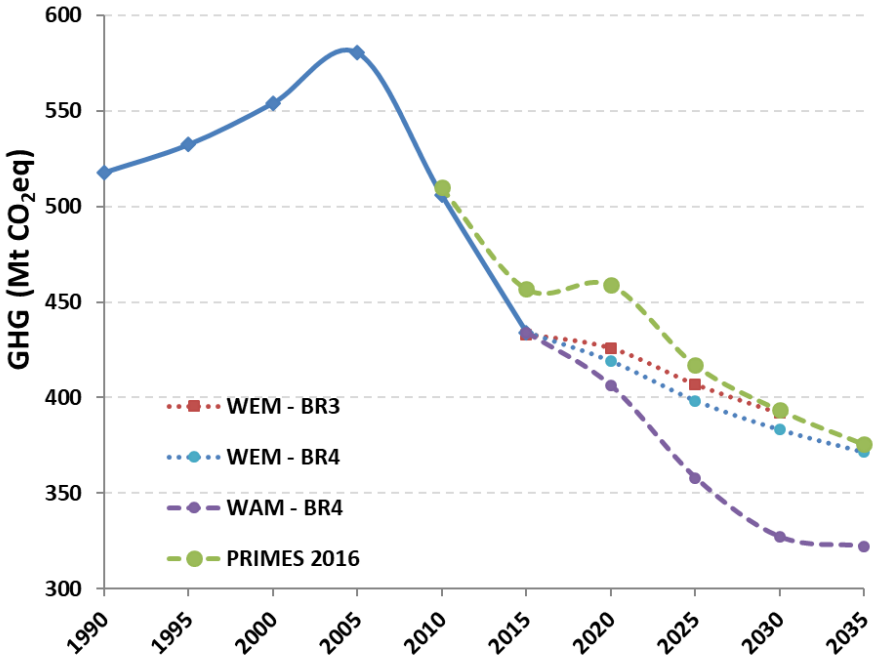
lately in 2019. As can be seen in Figure 5.12 the additional measures allow further reduction of GHG emissions starting from 2020. The WAM projected emissions for 2035 are 13.3% below the level of WEM scenario due to a decrease of energy related emissions for energy industries, transport, and civil sector. At the moment, no measures are planned for no energy sectors. The total impact of additional measures determines a reduction of GHG emissions of -25.8% wrt 2015 level to be compared with -14.4% for WEM scenario.

Table 5.22 – WAM Scenario's GHG emissions, disaggregated by source of emission sector ($MtCO_2$ eq.)

| | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|
| ***FROM ENERGY USES, of which:*** | **425.2** | **439.4** | **459.1** | **479.7** | **418.6** | **352.8** | **327.7** | **283.2** | **255.7** | **253.6** |
| Energy industries | 137.2 | 141.7 | 149.5 | 157.5 | 136.7 | 105.8 | 89.5 | 61.6 | 57.0 | 58.7 |
| Industry | 93.2 | 91.3 | 92.2 | 87.7 | 61.6 | 51.0 | 53.1 | 51.6 | 48.4 | 52.9 |
| Transport | 102.2 | 114.3 | 123.8 | 128.4 | 115.2 | 106.0 | 98.6 | 95.6 | 82.7 | 78.8 |
| Residential and Commercial | 69.5 | 68.8 | 73.0 | 86.0 | 87.5 | 74.3 | 71.2 | 59.5 | 53.0 | 48.5 |
| Agriculture (energy use) | 9.1 | 9.6 | 8.9 | 9.3 | 8.1 | 7.7 | 7.6 | 7.4 | 7.4 | 7.4 |
| Other | 14.0 | 13.7 | 11.7 | 10.7 | 9.5 | 8.0 | 7.8 | 7.4 | 7.2 | 7.2 |
| **FROM OTHER SOURCES, *of* which:** | **92.5** | **93.1** | **95.0** | **100.9** | **87.2** | **81.2** | **78.5** | **74.8** | **71.4** | **68.6** |
| Industrial Processes + F-gas | 40.5 | 38.4 | 39.2 | 47.2 | 36.7 | 32.6 | 32.2 | 30.4 | 28.5 | 27.7 |
| Agriculture | 34.7 | 34.7 | 33.9 | 31.9 | 30.0 | 30.1 | 30.6 | 30.3 | 30.0 | 29.6 |
| Waste | 17.3 | 20.0 | 21.9 | 21.9 | 20.4 | 18.6 | 15.7 | 14.1 | 12.8 | 11.2 |
| **TOTAL** | **517.7** | **532.4** | **554.1** | **580.6** | **505.8** | **434.0** | **406.2** | **358.1** | **327.0** | **322.1** |

Source: ISPRA

Figure 5.12 – Actual and projected GHG emissions (Mt $CO_2$ eq.)




Soure: ISPRA

**CTF Table 5: Summary of key variables and assumptions used in the projections analysis**

| | | Historical | | | | | | | | | Projected | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Key underlying assumptions | Unit | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 | 2018 | 2020 | 2025 | 2030 |
| Population | unit | | | | | 59,190,143 | 60,795,612 | 60,665,551 | 60,589,445 | 60,483,973 | 61,193,031 | 62,231,845 | 63,326,676 |
| Gross domestic product (GDP):-Constant prices | EUR million (2010) | | | | | 1,604,515 | 1,557,180 | 1,577,207 | 1,604,274 | 1,616,697 | 1,666,404 | 1,766,986 | 1,874,834 |
| Gross value added (GVA) agriculture | EUR million (2010) | | | | | 28,417 | 29,221 | 27,006 | 28,009 | 28,227 | 28,673 | 29,464 | 29,973 |
| Gross value added (GVA) constructions | EUR million (2010) | | | | | 81,207 | 63,627 | 60,137 | 64,524 | 65,485 | 67,443 | 70,621 | 75,028 |
| Gross value added (GVA) tertiary | EUR million (2010) | | | | | 1,063,043 | 1,055,278 | 1,056,333 | 1,077,553 | 1,093,393 | 1,125,810 | 1,203,401 | 1,284,487 |
| Gross value added (GVA) energy sector | EUR million (2010) | | | | | 25,238 | 19,745 | 19,084 | 18,931 | 19,170 | 19,656 | 20,228 | 21,161 |
| Gross value added (GVA) industry | EUR million (2010) | | | | | 245,341 | 243,809 | 250,810 | 260,815 | 263,241 | 268,194 | 276,476 | 286,360 |
| EU ETS carbon price | EUR 2016/tCO2 | | | | | | 7.80 | 9.34 | 10.88 | 12.42 | 15.50 | 23.30 | 34.70 |
| International (wholesale) fuel import prices:-Electricity Coal | EUR2013/GJ | | | | | | 1.78 | 1.86 | 1.95 | 2.04 | 2.21 | 2.65 | 3.18 |
| International (wholesale) fuel import prices:-Crude Oil | EUR2013/GJ | | | | | | 7.46 | 8.29 | 9.12 | 9.95 | 11.61 | 13.18 | 14.52 |
| International (wholesale) fuel import prices:-Natural gas | EUR2013/GJ | | | | | | 6.00 | 6.30 | 6.59 | 6.88 | 7.47 | 8.08 | 8.79 |
| N° of heating degree days (HDD) | Count | | | | | 1,992 | 1,818 | 1,815 | 1,813 | 1,810 | 1,802 | 1,787 | 1,775 |
| N° of cooling degree days (CDD) | Count | | | | | 534 | 569 | 571 | 574 | 576 | 583 | 597 | 611 |
| N° of passenger-km (all modes) | million pkm | | | | | 959,227 | 939,935 | 949,431 | 958,928 | 968,424 | 996,913 | 1,011,175 | 1,044,145 |
| Freight transport tonnes-km (all modes) | million tkm | | | | | 268,341 | 218,909 | 221,720 | 224,531 | 227,342 | 235,774 | 249,073 | 262,740 |
| Number of households | million | | | | | 24.50 | 25.85 | 25.90 | 25.94 | 25.99 | 26.29 | 26.96 | 27.66 |
| Household size | inhabitants/Household | | | | | 2.40 | 2.35 | 2.37 | 2.38 | 2.40 | 2.33 | 2.31 | 2.29 |
| Livestock:-Dairy cattle | 1000 heads | | | | | 1,746 | 1,826 | 1,822 | 1,791 | 1,693 | 1,653 | 1,642 | 1,631 |
| Livestock:-Non-dairy cattle | 1000 heads | | | | | 4,086 | 3,955 | 4,108 | 4,158 | 4,230 | 4,090 | 4,057 | 3,970 |
| Livestock:-Sheep | 1000 heads | | | | | 7,900 | 7,149 | 7,285 | 7,215 | 7,179 | 7,861 | 7,934 | 7,985 |
| Livestock:-Pig | 1000 heads | | | | | 9,321 | 8,675 | 8,478 | 8,571 | 8,492 | 9,526 | 9,596 | 9,693 |
| Livestock:-Poultry | 1000 heads | | | | | 198,347 | 196,387 | 205,194 | 199,981 | 192,887 | 201,310 | 204,378 | 205,590 |
| N input from application of synthetic fertilizers | kt nitrogen | | | | | 497 | 518 | 567 | 523 | 495 | 610 | 610 | 610 |
| N input from application of manure | kt nitrogen | | | | | 448 | 452 | 459 | 458 | 450 | 462 | 481 | 487 |
| N fixed by N-fixing crops | kt nitrogen | | | | | 170 | 166 | 168 | 170 | 168 | 157 | 153 | 149 |
| N in crop residues returned to soils | kt nitrogen | | | | | 190 | 177 | 185 | 167 | 181 | 145 | 135 | 133 |
| Area of cultivated organic soils | Ha (hectares) | | | | | 25,480 | 25,480 | 25,480 | 25,480 | 23,247 | 25,480 | 25,480 | 25,480 |
| Municipal solid waste (MSW) | tonne MSW | | | | | 32,479,112 | 29,524,341 | 30,112,048 | 29,587,660 | 30,164,516 | 31,114,254 | 31,405,108 | 31,605,044 |
| Municipal solid waste (MSW) to landfills | tonne MSW | | | | | 18,824,671 | 11,214,095 | 11,214,095 | 11,214,095 | 9,997,612 | 8,372,594 | 7,562,615 | 6,717,135 |
| Share of CH4 recovery in total CH4 from landfills | % | | | | | 34.86 | 41.21 | 41.21 | 41.21 | 41.70 | 50.57 | 53.46 | 56.14 |

**CTF Table 6(a): Information on updated greenhouse gas projections (with measures)**

| GHG emissions projections | Unit | GHG emissions and removals | | | | | | | | GHG emission projections - Scenarios | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | With measures | |
| | | Base Year | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2017 | 2020 | 2030 |
| Sector | | | | | | | | | | | |
| Energy | kt $CO_2$ eq | 229780.81 | 229780.81 | 233739.07 | 243090.98 | 263478.77 | 241777.72 | 195856.98 | 195236.24 | 180604.98 | 161832.79 |
| Transport | kt $CO_2$ eq | 102216.82 | 102216.82 | 114272.51 | 123808.39 | 128449.55 | 115247.85 | 106008.42 | 99486.61 | 103454.19 | 96565.76 |
| Industry/industrial processes | kt $CO_2$ eq | 133706.70 | 133706.70 | 129713.58 | 131373.30 | 134898.43 | 98336.55 | 83542.47 | 83955.45 | 88608.27 | 81975.62 |
| Agriculture | kt $CO_2$ eq | 34739.37 | 34739.37 | 34700.64 | 33945.95 | 31893.08 | 30012.21 | 30065.25 | 30780.40 | 30649.81 | 30042.41 |
| Forestry/LULUCF | kt $CO_2$ eq | -3283.49 | -3283.49 | -21918.54 | -16229.02 | -28376.65 | -34673.61 | -39608.02 | -18378.89 | -25979.98 | -23428.71 |
| Waste management/waste | kt $CO_2$ eq | 17301.95 | 17301.95 | 19993.22 | 21887.13 | 21880.06 | 20398.72 | 18570.67 | 18249.14 | 15705.28 | 12810.76 |
| Other Sectors | | | | | | | | | | | |
| Gases | | | | | | | | | | | |
| $CO_2$ emissions including net $CO_2$ from LULUCF | kt $CO_2$ eq | 434049.81 | 434049.81 | 428340.63 | 452453.22 | 465108.38 | 390907.75 | 315558.40 | 328642.80 | 316297.85 | 292477.30 |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | kt $CO_2$ eq | 439639.71 | 439639.71 | 451433.24 | 470293.76 | 494458.04 | 426350.97 | 355784.64 | 348991.36 | 343316.41 | 316870.95 |
| $CH_4$ emissions including $CH_4$ from LULUCF | kt $CO_2$ eq | 49746.27 | 49746.27 | 50707.09 | 51698.04 | 48658.81 | 47275.82 | 44091.25 | 45333.44 | 42236.72 | 38654.67 |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | kt $CO_2$ eq | 48262.93 | 48262.93 | 50360.89 | 50765.19 | 48299.49 | 46918.91 | 43800.50 | 43852.32 | 41754.39 | 38245.98 |
| $N_2O$ emissions including $N_2O$ from LULUCF | kt $CO_2$ eq | 26906.88 | 26906.88 | 28258.25 | 29123.26 | 28401.24 | 19238.32 | 17874.51 | 18284.66 | 18447.70 | 17541.73 |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | kt $CO_2$ eq | 26083.81 | 26083.81 | 27430.38 | 28444.59 | 27787.54 | 18825.62 | 17547.05 | 17796.11 | 17891.45 | 16985.48 |
| HFCs | kt $CO_2$ eq | 444.00 | 444.00 | 926.65 | 2476.87 | 7512.23 | 11723.95 | 14703.35 | 15294.12 | 14074.90 | 9182.22 |
| PFCs | kt $CO_2$ eq | 2906.86 | 2906.86 | 1492.31 | 1488.50 | 1939.95 | 1520.39 | 1688.33 | 1313.68 | 1613.77 | 1613.77 |
| $SF_6$ | kt $CO_2$ eq | 408.35 | 408.35 | 679.72 | 604.31 | 550.00 | 393.79 | 472.25 | 417.49 | 343.18 | 301.08 |
| $NF_3$ | kt $CO_2$ eq | | | 76.57 | 13.26 | 33.38 | 20.17 | 28.42 | 23.50 | 28.42 | 27.84 |
| Other gases | | | | | | | | | | | |
| Unspecified mix of HFCs and PFCs | kt $CO_2$ eq | | | 19.26 | 19.26 | 19.26 | 19.26 | 19.26 | 19.26 | 0.00 | 0.00 |
| Total with LULUCF [f] | kt $CO_2$ eq | 514,462.17 | 514,462.17 | 510,500.49 | 537,876.73 | 552,223.24 | 471,099.44 | 394,435.77 | 409,328.96 | 393,042.54 | 359,798.62 |
| Total without LULUCF | kt $CO_2$ eq | 517,745.65 | 517,745.65 | 532,419.03 | 554,105.75 | 580,599.89 | 505,773.05 | 434,043.79 | 427,707.85 | 419,022.52 | 383,227.33 |

**CTF Table 6(c): Information on updated greenhouse gas projections (with additional measures)**

| GHG emissions projections | Unit | GHG emissions and removals | | | | | | | | GHG emission projections - Scenarios | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | With additional measures | |
| | | Base Year | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2017 | 2020 | 2030 |
| Sector | | | | | | | | | | | |
| Energy | kt $CO_2$ eq | 229780.81 | 229780.81 | 233739.07 | 243090.98 | 263478.77 | 241777.72 | 195856.98 | 195236.24 | 176043.42 | 124538.12 |
| Transport | kt $CO_2$ eq | 102216.82 | 102216.82 | 114272.51 | 123808.39 | 128449.55 | 115247.85 | 106008.42 | 99486.61 | 98565.78 | 82684.59 |
| Industry/industrial processes | kt $CO_2$ eq | 133706.70 | 133706.70 | 129713.58 | 131373.30 | 134898.43 | 98336.55 | 83542.47 | 83955.45 | 85266.74 | 76960.52 |
| Agriculture | kt $CO_2$ eq | 34739.37 | 34739.37 | 34700.64 | 33945.95 | 31893.08 | 30012.21 | 30065.25 | 30780.40 | 30649.81 | 30042.41 |
| Forestry/LULUCF | kt $CO_2$ eq | -3283.49 | -3283.49 | -21918.54 | -16229.02 | -28376.65 | -34673.61 | -39608.02 | -18378.89 | -25979.98 | -23428.71 |
| Waste management/waste | kt $CO_2$ eq | 17301.95 | 17301.95 | 19993.22 | 21887.13 | 21880.06 | 20398.72 | 18570.67 | 18249.14 | 15705.28 | 12810.76 |
| Other Sectors | | | | | | | | | | | |
| Gases | | | | | | | | | | | |
| $CO_2$ emissions including net $CO_2$ from LULUCF | kt $CO_2$ eq | 434049.81 | 434049.81 | 428340.63 | 452453.22 | 465108.38 | 390907.75 | 315558.40 | 328642.80 | 303691.15 | 237016.16 |
| $CO_2$ emissions excluding net $CO_2$ from LULUCF | kt $CO_2$ eq | 439639.71 | 439639.71 | 451433.24 | 470293.76 | 494458.04 | 426350.97 | 355784.64 | 348991.36 | 330709.71 | 261409.82 |
| $CH_4$ emissions including $CH_4$ from LULUCF | kt $CO_2$ eq | 49746.27 | 49746.27 | 50707.09 | 51698.04 | 48658.81 | 47275.82 | 44091.25 | 45333.44 | 42154.04 | 38384.00 |
| $CH_4$ emissions excluding $CH_4$ from LULUCF | kt $CO_2$ eq | 48262.93 | 48262.93 | 50360.89 | 50765.19 | 48299.49 | 46918.91 | 43800.50 | 43852.32 | 41671.71 | 37975.31 |
| $N_2O$ emissions including $N_2O$ from LULUCF | kt $CO_2$ eq | 26906.88 | 26906.88 | 28258.25 | 29123.26 | 28401.24 | 19238.32 | 17874.51 | 18284.66 | 18345.58 | 17082.60 |
| $N_2O$ emissions excluding $N_2O$ from LULUCF | kt $CO_2$ eq | 26083.81 | 26083.81 | 27430.38 | 28444.59 | 27787.54 | 18825.62 | 17547.05 | 17796.11 | 17789.32 | 16526.34 |
| HFCs | kt $CO_2$ eq | 444.00 | 444.00 | 926.65 | 2476.87 | 7512.23 | 11723.95 | 14703.35 | 15294.12 | 14074.90 | 9182.22 |
| PFCs | kt $CO_2$ eq | 2906.86 | 2906.86 | 1492.31 | 1488.50 | 1939.95 | 1520.39 | 1688.33 | 1313.68 | 1613.77 | 1613.77 |
| $SF_6$ | kt $CO_2$ eq | 408.35 | 408.35 | 679.72 | 604.31 | 550.00 | 393.79 | 472.25 | 417.49 | 343.18 | 301.08 |
| $NF_3$ | kt $CO_2$ eq | | | 76.57 | 13.26 | 33.38 | 20.17 | 28.42 | 23.50 | 28.42 | 27.84 |
| Other gases | | | | | | | | | | | |
| Unspecified mix of HFCs and PFCs | kt $CO_2$ eq | | | 19.26 | 19.26 | 19.26 | 19.26 | 19.26 | 19.26 | 0.00 | 0.00 |
| Total with LULUCF [f] | kt $CO_2$ eq | 514,462.17 | 514,462.17 | 510,500.49 | 537,876.73 | 552,223.24 | 471,099.44 | 394,435.77 | 409,328.96 | 380,251.04 | 303,607.68 |
| Total without LULUCF | kt $CO_2$ eq | 517,745.65 | 517,745.65 | 532,419.03 | 554,105.75 | 580,599.89 | 505,773.05 | 434,043.79 | 427,707.85 | 406,231.02 | 327,036.39 |

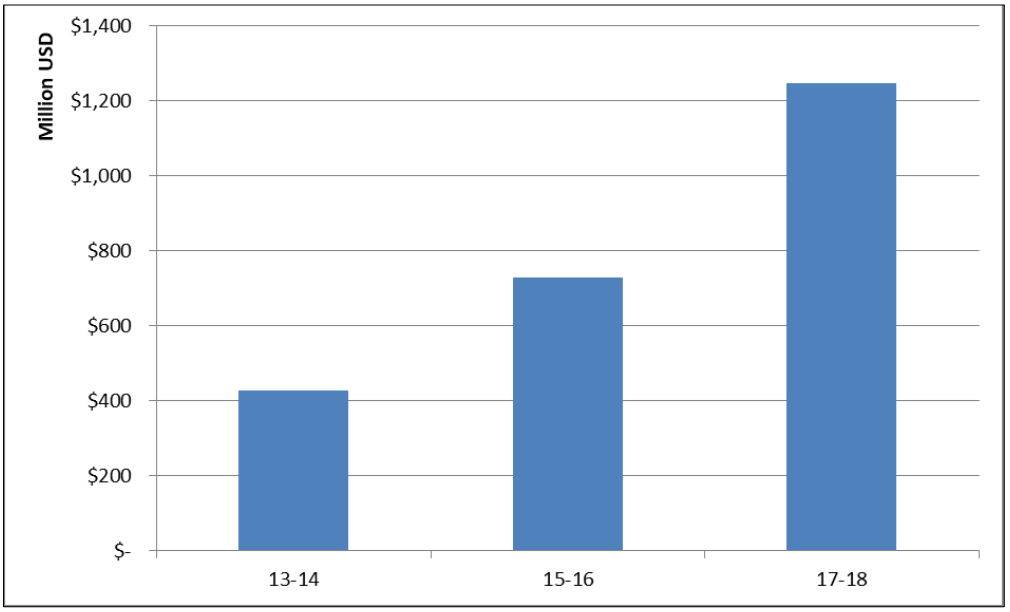
# 6. Financial resources and transfer of technology, including information under art. 10-11 of Kyoto Protocol[40]

## *6.1 Provision of New and additional resources*

Italy is keeping up efforts to scale-up its international climate finance, and will continue to do so. Our public climate finance in the period 2017-2018 increased substantially compared to the levels of previous years (2013-2014 and 2015-2016), while providing more detailed information at project level.

Total public climate specific support that is currently being reported amounts, for the biennium **2017-2018,** to **1,25 billion** US dollars almost doubling the figure with respect to the previous biennium 2015-2016, when Italian public climate finance summed up to 729,75 million US dollars. Compared to the biennium 2013-14, Italian climate finance is today almost three times higher. The total public climate specific support for the period 2013-2018 amounts to 2.405,4 million US dollars.

**Italian Public Climate Finance 2013-2018**




In the provision of public financial resources, Italy aims to strike a fair balance between mitigation and adaptation over time. The adaptation component in 2017-2018 represents 65% of the total public climate finance addressing mitigation and adaptation, without considering crosscutting activities[41]. This shows a significant increase in adaptation finance, responding to the needs of developing countries of public grants addressing adaptation and resilience across different sectors.

Since 2015, Italian Development Cooperation has undergone an important legislative reform. The new system is gradually being implemented, against the backdrop of our European and International goals and

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[41] Cross cutting activities, by definition, address both mitigation and adaptation objectives as an inherent feature of the activity itself. Any tentative split of the budget of those activities would be arbitrary and not accurate for most of them

partnerships. The reform of the Italian Development Cooperation has led to a new institutional framework designed to make it more effective as well as cooperation policies more consistent. Under the new system, the Ministry of Foreign Affairs and International Cooperation is seen to give guidance in the definition of cooperation policies, while the Italian Development Cooperation Agency, established following the reform, is in charge of implementing policies. The law also confirms the role of financial institution in development cooperation given to the "Cassa Depositi e Prestiti Spa" (CDP), with new innovative Public Private Partnership mechanisms. In addition, a permanent inter-ministerial "table" for coordinating support in the field of climate change (priorities, actions, countries etc.) has been set up.

In this context, the Italian development cooperation aims at effectively mainstreaming environmental and climate results into its activities. Since 2015, the Italian Government continues allocating additional financial resources to the international development cooperation. On top of these resources, the commitment of Italy to tackle climate change and related support to developing countries is strongly expressed in Decree nr.30 (DLGS n.30 13/03/2013). In fact, this latter defines the criteria for the allocation of the proceeds from auctioning of greenhouse gas emission allowances. In particular, it is established that at least 50% of those proceeds should be used to reduce greenhouse gas emissions; to adapt to the impacts of climate change; to fund research and development for reducing emissions and promote adaptation; to develop renewable energies and increase energy efficiency; to contribute to the Global Energy Efficiency and Renewable Energy Fund and to the Adaptation Fund; to provide for measures to avoid deforestation and facilitate adaptation in developing countries. The proceeds from auctioning of greenhouse gas emission allowances has been allocated as described above by the Italian Ministry for the Environment, starting from 2015. These resources represent additional public climate financial resources to developing country Parties.

An integrative approach to environment and development has been adopted in development actions run by the **Ministry of Foreign Affairs and International Cooperation (MFA)**, housing the traditional development cooperation originally focused on social and economic challenges. In this light, efforts have been aimed at environmental compliance, integration, and mainstreaming in all sorts of programmes and financing, resulting in adding a climate change component in more than 300 initiatives. The specific approach by MFA cooperation is therefore characterized by the integration of climate change in the 2030 Development Agenda.

Taking into account also recent evidence of migratory implications, Italian MFA approach to targeted concrete territories is growingly shaped – where appropriate – as integrated landscape management, i.e. aiming at maximizing co-benefits in the framework of coupled and resonant environmental and societal consolidation cycles. Target integration sectors are mainly: agriculture, food security, smart cities, biodiversity conservation, water, energy, off grid power, reforestation and biodiversity in general, land recovery and combating desertification, seas and fishing, disaster risk management, sustainable marketing supply chains, wetlands, waste. Geographical distribution reflects not only mitigation and adaptation, but also the need to address destabilization patterns in areas where environmental fragility overlaps socio-economic and/or governance weakness.

During the biennial 2017-18, the **Italian development cooperation** activities were pursued in line with the reform of the Italian Development Cooperation proposed by the Law 125/2014. In particular, the **Italian Ministry for the Environment, Land and Sea (IMELS)** has continued its efforts for the pursuit of the **objectives of the Paris Agreement** and of the **2030 Sustainable Development Agenda** that aims the integration of the economic, social, environmental and institutional pillars. Priority interest was given to the **African Continent** and to the countries most vulnerable to climate change impacts such as the **Small Islands Developing States**.

In order to concretely support the African countries for the implementation of the prefixed goals, the **Africa Centre for Climate and Sustainable Development (ACSD)** was established in Rome in partnership with UNDP, FAO and IMELS. At the occasion of the G7 Environment in Bologna (June 2017), Italy announced the launch of a Centre to facilitate the voluntary exchange of information and activities in supporting of the African Countries.

The purpose of ACSD is to promote greater effectiveness, synergies and complementarity of ongoing initiatives in Africa related to climate change impacts, environmental degradation on agricultural production, food security, water availability, as well as on stability and economic growth of the region. The objective is also to promote the transition to a new energy model of the African Countries. Since 2018, ACSD has supported IMELS in the implementation of cooperation activities in the field of **climate change vulnerability, desertification and biodiversity conservation**. To this regard, ACSD has strengthen the role of Italy in the Sahel region.

As stated in the Programming Document 2017-2019 of MFA, IMELS has focused additional interest on specific areas such as: the conservation and sustainable use of the oceans, seas and marine resources (SDG's 14), the protection, restoration and promotion of the terrestrial ecosystem, sustainably manage of forests and fight against desertification/land degradation, loss of biological diversity (SDG 15) and on the renewable energy sector.

Specifically, IMELS is currently committed to the implementation of activities through the strengthening of existing partnerships with the Small Pacific Islands, the Caribbean, the Maldives and the Comoros, favoring the involvement of the private sector together with the local communities and sharing experiences acquired at national level. The growing attention to the conservation of the marine ecosystem and its resources is rooted among in the need to implement adaptation strategies for the most vulnerable populations to climate change. In this context, IMELS, at the request of the developing Small Islands, is carrying out projects centered on the climate-oceans link, bringing together the activities of rural electrification with the protection of the oceans. The electrification of the fishing centers of the remote islands has made it possible to achieve results of energy security and mitigation and, at the same time, to strengthen small local fishing communities by encouraging sustainable fishing for small scale and supporting the food security of local populations, as well as the conservation of marine and coastal habitats, for an ecological, economic and social resilience.

IMELS' is also supporting the REDD+ programme, which assumes a fundamental importance in the contribution to the sustainable development strategy of the developing countries and in the fight against climate change. The countries most involved are those of the main tropical forest basins in South America, Africa and Asia. IMELS's activities will be carried out through the support to the World Bank Carbon Forest Partnership, bilateral agreements with the United Nations to promote the presentation of projects to multilateral funds, bilateral Memorandums of Understanding with countries, such as Ghana, Panama, Papua New Guinea, Kenya and the Dominican Republic. In particular, the intention is to encourage the involvement of the private sector in support of mitigation and adaptation to climate change in the forest sector. In this sense, the signing of the Declarations of Amsterdam on deforestation and agricultural supply chains and sustainable palm oil, constitutes a support of our Government to the efforts of the Italian private sector, engaged for years in the sustainability of agricultural product chains.

In the energy sector, Italy boasts some qualifying elements linked to its industrial and entrepreneurial history, to which the experiences of civil society and the scientific and training skills developed by the world of research and universities are added. Based on the heritage of experience and knowledge of actors of partner countries, the Italian Cooperation intends to promote a clear process innovation, centered on three thematic lines with a fourth transversal accompanying element necessary for the sustainability of the interventions:

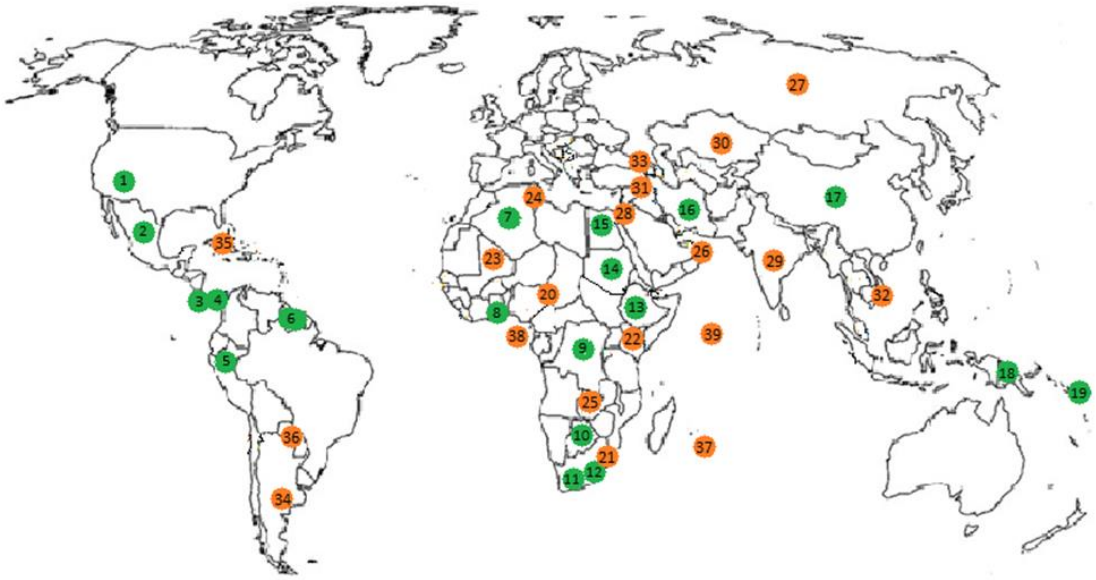
- appropriate and sustainable technologies for local contexts;
- new models for autonomous income-generating energy activities that can be rooted in territorial contexts (BOP Model), social and cooperative entrepreneurship) grafts on adequate financed mechanisms to support the emerging forms of entrepreneurship;
- support the development of enabling policies and regulatory mechanisms that lead to a modernization of energy governance, interpreting specific needs and local needs;
- strengthen the local level and encourage empowerment through the development of on-site technical and managerial skills and abilities and training at different levels: schools, universities, vocational courses and vocational training courses and entrepreneurial development including institutional and political advocacy.

The geographical areas that have, due to the consolidated and diversified Italian presence, favorable area of application of these lines, are the southern area of the Mediterranean (North Africa), Eastern and Southern Africa (Mozambique and South Africa) and some countries of Central and Western Africa (Congo, Nigeria, Ghana) where the main Italian companies have been operating in the last decade, in synergy with the actors of the civil society and the research communities.

During the period 2017-2018, the bilateral cooperation activities promoted by **IMELS** have continued increasing through the signature of **21 new bilateral agreements** to support mitigation and adaptation actions, to facilitate access to climate finance, to provide capacity building and technology transfer. The strategy underlying the identification of priority countries, defined jointly with the Ministry of Foreign Affairs and International Cooperation, the Italian Agency for Cooperation and Cassa Depositi and Prestiti, has involved mainly the Sub-Saharan Countries (Eswatini, Kenya, Mali, Zambia, Mauritius, Sao Tome and Principe, Seychelles) including an Intergovernmental organization (Lake Chad Commission) and a minor quantity of other territories, such as: MENA region (Tunisia, Jordan, Unites Arab Emirates), Eastern Europe region (Kazakhstan, Kurdistan, Russian Federation, Georgia), Central/Latin America region (Argentina, Cuba, Paraguay) and Asian region (India, Vietnam).

Priority actions have been confirmed on the same eight specific areas: management of extreme events, promotion of renewable energy and energy efficiency, water resources management, waste management, air quality, address forest degradation, land rehabilitation and soil improvement, sustainable mobility.

**IMELS Bilateral cooperation 2015-2018**



**Bilateral Cooperation 2015-2016**
1. Nevada; 2. Mexico; 3.Costa Rican; 4.Panama; 5.Peru; 6. CARICOM; 7. Algerian; 8. Ghana; 9. Democratic Republic of the Congo; 10. Botswana; 11. South Africa; 12. Lesotho; 13. Ethiopia; 14 Sudan; 15 Egypt; 16 Iran; 17 China; 18 Papua New Guinea; 19 Pacific Islands.
**Bilateral Cooperation 2017-2018**
20. Lake Chad Commission (Cameroon, Chad,Niger,Nigeria); 21 eSwatini; 22 Kenya; 23 Mali; 24 Tunisia; 25 Zambia; 26 United Arab Emirates; 27 Russian Federation; 28 Jordan; 29 India; 30 Kazakhstan; 31 Kurdistan (Iraq); 32 Vietnam; 33 Georgia; 34 Argentina; 35 Cuba; 36 Paraguay; 37 Mauritius; 38 Sào Tome and Principe; 39 Seychelles.

The activities developed within the new 21 Memorandum of Understanding were focused on the negotiation and approval of the framework documents that regulate the cooperation activities such as: *Rules of Procedures, Guiding Principles, Financial Document.* In addition, a *Medium-Term Work Plan* was elaborated. Regarding the activities laid down by the precedent 31 Memorandum of Understanding already signed in the

biennial 2015-2016, they began the implementation of their initiatives described in detail in the paragraph titled "*Bilateral cooperation with developing countries".*

All projects and programs financed in this context has been proposed by developing countries and reflect priorities and objectives, including Nationally Determined Contributions (NDCs) and other relevant climate change and national environmental strategies.

### *Methodological approach*

The **methodological approach** for tracking and reporting on the provision of financial, technological and capacity-building support to non-Annex I Parties considers:

- a combination of all the Rio Markers and the Aid to Environment marker for bilateral and multi-bilateral figures employed to report to the OECD DAC, while imputes a climate relevant share to multilateral contributions based on OECD or the organizations' reports, thus taking into account the field activities actually implemented by the international organizations themselves;
- committed funds for bilateral flows and disbursed funds for multilateral flows, so that they do not overlap with past year's figures, avoiding double counting across the years;
- climate specific and core/general amounts as mutually exclusive: the figure reported as core/general is the result of the whole contribution to the multilateral institutions minus the climate specific share, computed according to the imputed multilateral shares provided by the DFIs themselves (or through the OECD calculations or the share of activities reported by DFIs);
- most part of the Italian public development cooperation is in form of public grants through official agencies. Thus, almost all contributions are classified as Official Development Assistance. This classification, as well as the "other official flows" category, follows the definition agreed in the context of the OECD DAC;
- The sector assigned in the OECD DAC CRS table is reported in the relevant column. As requested, the notation "Not applicable" is reported in case of purely multilateral contributions, where it is up to the international organization itself to conduct the field activities.

The methodology has been developed and agreed among the Ministry for the Environment, Land and Sea and the Ministry of Foreign Affairs and Development Cooperation - which coordinates development cooperation activities at all levels, from the central public administration to local government and universities.

Public financial support provided through bilateral channels, from 2017, includes both bilateral and multi-bilateral flows. This represents the only methodological adjustment since the previous biennium The second includes finance that flows through multilateral organizations but earmarked towards specific country or multi-country projects, in line with the definition provided by the OECD DAC CRS reporting directives. The adaptation/mitigation/crosscutting categories are imputed according to either the Rio Markers, or the sector indicated in the OECD DAC CRS database.

**Bilateral flows** include contributions to development cooperation programmes from all the central public administrations (Ministries) and the Italian Development Cooperation Agency (AICS), the Italian Development Bank (Artigiancassa / Cassa Depositi e Prestiti), Local administrations (regions and municipalities), considering all kind of implementing agencies (f.i. Universities, NGOs and religious organizations).

For bilateral contributions, Rio Markers assess the climate specific share of the projects. In particular, where the "significant" marker is reported, 40% of the total value of the project is reported as climate specific; 100% when the "principal" marker is reported. Priority is given to climate markers for mitigation and adaptation, but a combination of all the Rio Markers and Aid to Environment marker is considered. In particular, where the project description and the sector are relevant, either 100% or 40% of the value of

the project is reported. This qualitative consideration has been jointly led by the two Ministries, also referring to the OECD DAC Rio Markers for Climate Handbook.

For financial support through **multilateral** channels, the core-general column reports:

- the total contribution towards a multilateral institution/fund/DFI in case it is not possible to identify the climate-specific component of the contribution (i.e. missing imputed multilateral share, or organization with a climate-relevant component which do not provide an indication on the climate relevance); or

- the non-climate relevant part of the contribution towards the organization in case the climate specific component is reported.

The climate-specific column reports the whole amount of the contribution multiplied by the imputed multilateral share. The shares applied are:

o provided by the OECD (for 2017 flows, also applied for 2018) for all the institutions but UNDP and WFP;

o taken from institutional report for UNDP and WFP.

Only entirely disbursed contributions have been considered. Contributions are considered disbursed if they are reflected in official documents that proof the financial transaction (decreto di pagamento). In reporting the type of support, the nature and the purpose of the fund is considered, even though they mostly fall into the cross-cutting category.

The exchange rate used is the OECD figure for 2017 (0.887 €/$) and 2018 (0,847 €/$).

### *Private finance*

Italian bilateral development cooperation also aims to leverage private finance. Italy started accounting for private finance mobilized[42] through public interventions in developing countries[43] in the form of a pilot study on years 2015-2017. Applied methodologies have been developed by the Research Collaborative on Tracking Private Climate Finance[44] and agreed by the Development Assistance Committee of the Organization for Economic Co-operation and Development (OECD-DAC)[45]. The organization worked to harmonize methodologies for reporting on amounts mobilised from the private sector through official development finance interventions, defining them instrument by instrument. In the Italian context, those methodologies are applied in accordance with the principles of transparency, accuracy and reliability and adopting a conservative approach in cases of uncertainty. In order to avoid double counting, the attribution of private finance mobilized are considered pro-rata especially when more than one public donor is involved in the financing of a project.

The pilot study represents a first attempt to set a permanent data collection system, with the aim of defining a consistent path for future adjustments. According to the available data, the pilot study calculates public finance at a project/operation level, and does not take into account at this stage other forms of public support such as technical assistance for policy development. In the triennium 2015-2017, Italian public

[42] The term "mobilisation" describes the causal link between private finance made available for a specific project and an official intervention.
[43] According to the OECD DAC List of ODA Recipients, http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/DAC-List-of-ODA-Recipients-for-reporting-2018-and-2019-flows.pdf
[44] OECD's Research Collaborative on Tracking Private Climate Finance. The Research Collaborative is a network of governments, research institutions and international financial institutions aiming to coordinate research priorities in the field of private climate finance.
[45] For detailed information on methodologies, see OECD DAC CRS Directives, Annex 6 https://one.oecd.org/document/DCD/DAC/STAT(2018)9/ADD1/FINAL/en/pdf

sector leveraged private finance through grants, direct investments in companies and project finance. The data collection and the application of methodologies agreed in the context of the OECD is at its early stage for Italy, thus is does not cover all finance mobilized through public interventions.

The process of data collection implied a careful evaluation of the climate-relevance for the activities of each entity. Their information systems mainly did not consider the same categories as the OECD Rio Markers, employed by central and local administrations; therefore, dedicated interviews with entities were organized to evaluate the data available and find common criteria/categories for the climate-relevance assessment. In some cases, it was necessary to adopt a conservative approach and limiting the boundaries of data collection (for instance, restricting the analysis to the operations in the renewable energy sector). A second step was a further in-depth assessment of climate-relevance only on the retained projects. It was carried out in collaboration with each actor, analyzing all the relevant operations case by case.

Excluding climate-related export credits and investments from publicly-controlled enterprises, the total estimate of Italian public climate finance that directly mobilize private investments in developing countries between 2015 and 2017 is USD 29.526.579. This amount directly mobilized **USD 60.408.630** of private climate finance. For the year 2017 only, the amount mobilized reached **26.495.720 USD**.

Private climate finance mobilized by instruments adopted (in USD)

| **Italian private mobilized finance by financial instrument** | | | | |
|---|---|---|---|---|
| **Financial instrument** | **2015** | **2016** | **2017** | **Total (2015-2017)** |
| Project Finance | 29.280.000 | 4.170.000 | 8.950.000 | **42.400.000** |
| Direct Investments in companies | | | 16.280.000 | **16.280.000** |
| Grants | | 428.976 | 1.265.720 | **1.694.696** |
| **Total** | **29.280.000** | **4.598.976** | **26.495.720** | **60.374.696** |

For the sake of completeness and transparency, the table below provides an overview of other publicly-mobilized private climate-relevant financial amounts currently out of the scope of the official OECD DAC methodology. These financial flows reflects the specific Italian cases of publicly-controlled enterprises, and export credits issued by the public Export Credit Agency or the National Development Bank.

Other private climate finance sources (in USD)

| **Other climate finance sources** | |
|---|---|
| **Publicly-controlled enterprises climate-related investments** | 7.263.170.000 |
| **Climate-related export credits** | 2.667.227.810 |
| **Climate-related export credits reported by NDB** | 350.000.000 |

For the year 2018, data are not available yet. Italy looks forward to publish related data in the next National Communication to the UNFCCC.

To sum up, Italy's public financial resources to assist developing countries to develop and implement actions in the field of climate change in the period 2017 - 2018 came from:

- the Italian Ministry for the Environment, Land and Sea funds according to law June 1, 2002, n°120;
- the Italian Foreign Affairs Ministry funds for development cooperation;
- the Italian Ministry of Economy of Finance funds provided to multilateral institutions for environmental activities targeted for climate change;
- the proceeds from auctioning of greenhouse gas emission allowances allocated starting from 2015. According to Directive 2003/87/EC, the revenues generated from the auctioning of allowances should be used to tackle climate change in the EU and third countries;
- the financial contribution to the Green Climate Fund (GCF)
- the climate-related private financial resources directly mobilized by Italian public financial interventions, given that the private entities would not have contributed without the public finance intervention.

Provided that there is no common understanding on what is to be considered **"new and additional"**, only newly and additional committed or disbursed climate finance during the **period 2017 - 2018** originating from these above channels are considered as such, in particular: budget increase for development cooperation dedicated to climate change, revenues from auctioning of greenhouse gas emission allowances, financial contribution to the Green Climate Fund.

## *6.2 Assistance to developing country Parties that are particularly vulnerable to climate change*

### *6.2.1 Multilateral Cooperation on climate change*

Between 2017 and 2018, the Italian multilateral environmental activities were carried out in several organizations or programmes, such as: the World Bank (WB), the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Adaptation Fund (AF), the Food and Agriculture Organisation (FAO), the Initiative Climate Action Transparency (ICAT), REDD+ implementation, the African Development Bank (ADB) and the Inter-American Development Bank.

**Multilateral International cooperation** of IMELS has been strengthened through its participation in funds and programs promoting renewable energy, energy efficiency and resilience to climate change. Some examples of this specific multilateral cooperation are from: **World Bank –WB- and the International Finance Corporation** -**IFC**- (*Clean Energy Access Program Trust Fund, Promoting Africa's Green and Climate Resilient Development Program and the Communication for Climate Change Multidonor Trust Fund – CCC);* from the **African Development Bank** –**ADB**-(A*frica Climate Change Fund and Sustainable Energy Fund for Africa)* and from the **Interamerican Development Bank** –**IDB**- (*supporting the Sustainable Energy Facility for the Eastern Caribbean)*. For the implementation of the UNFCCC commitments, IMELS contributes to the Green Climate Fund, the Adaptation Fund and UNEP, the program inquiry into the design of a sustainable financial system.
Furthermore, IMELS has been participating in various trust funds at the WB and IFC with the aim of promoting sustainable development in developing countries, increasing renewable energy and improving awareness, globally, on environmental issues and the fight against climate change.
In the years 2017 to 2018, as energy access continues to be a priority for our government, IMELS continued and expanded its longstanding support to Global Lighting and Energy Access partnership (Global LEAP), the voluntary forum bringing together Governments, Development Partners and private entities in order to

share knowledge and best practices and support the development of systems of access to energy, with particular attention to the quality and prices of off-grid lighting systems.
Building on the success that has been able to achieve through the Global Lighting and Energy Access Partnership (Global LEAP), in 2017 IMELS decided to support the impact of emerging technology to promote sustainable economic development. Therefore provided additional financial resources to expand the uses of solar energy for both domestic and small commercial applications (agricultural uses as solar irrigation, as well as innovative uses of emerging storage technology). Moreover, in 2018, IMELS, in view of supporting Sub-Saharan Africa in the effort to achieve universal energy access, decided to provide financial contribution to programs able to scale up off-grid energy solutions through Public-Private Partnerships in Sub-Saharan Africa.
To support African countries to prepare and seek financing for programs and projects contributing to the implementation of the National Determined Contributions (NDCs) communicated to the UNFCCC, IMELS financed in 2017 the program "Promoting Africa's Green and Climate Resilient Development (AGREED)".
IMELS also continued its support to the Communication for Climate Change Multi-Donor Trust Fund (MDTF), with the aim of promoting communication and awareness-raising activities in favor of sustainable development.
Thanks to this support, the **Connect4Climate network** was launched in 2013 and a global platform was created to promote climate change awareness raising activities involving more than 200 partners worldwide (civil society groups, international organizations, Enterprises, media, universities, etc.).

The **Green Climate Fund (GCF)** is a new global fund created to support the efforts of developing countries to respond to the challenge of climate change. It seeks to promote a paradigm shift to low-emission and climate-resilient development, taking into account the needs of nations that are particularly vulnerable to climate change impacts. By the end of 2019 the Fund's portfolio consisted of 128 projects and programmes amounting to USD USD 5.6 billion billion in GCF funding. The GCF approvals demonstrate how the Fund aims to balance projects approvals between mitigation and adaptation as well as between different regions at the same time taking into account the most vulnerable developing countries, including LDCs, SIDS and African States. The GCF is also dedicating significant resources to support country partners in developing high quality country-owned programmes. In particular, the GCF Readiness Programme aims to support five outcomes connected to the Programme objectives: strengthening country capacity, engaging stakeholders in consultative processes, realizing direct access, providing access to finance, and mobilizing the private sector. In addition, the GCF's Project Preparation Facility supports accredited entities, especially direct access entities, to develop high quality GCF funding proposals.

Italy is a strong supporter of the Green Climate Fund (GCF), as the key multilateral vehicle for helping developing countries adapt to climate change and follow low-carbon development paths. In 2014, at the GCF donor conference, Italy pledged to contribute to the first capitalization of the Fund with 250 million euro. The Italian Ministry for the Environment provided 150 million euro for the period 2017-2018. IMELS, in the context of its bilateral programmes, is supporting developing countries partners in accessing the resources of the Green Climate Fund and developing projects through existing accredited entities.
During the Pledging Conference on 24-25 October 2019, hosted in Paris, France, Italy announced a contribution of 300 million euro **GCF's 2020-2023 replenishment (GCF-1)**.

The Ministry of Economy and Finance (MEF) of Italy is the member of, and the financial contributor to, the **Global Environment Facility (GEF)**. The GEF was established in 1991 and provides funding to developing countries and countries with economies in transition. The funding comes in the form of grants and concessional funding and covers the incremental or additional costs associated with transforming a project with national benefits into one with global environmental benefits (GEBs).

Financial contributions to GEF are replenished every four years by donor countries (GEF Replenishment). Italy, via the Ministry of Economy and Finance (MEF) is a donor of the GEF Trust Fund since its establishment.

MEF contributed to the Sixth and the Seventh Replenishment with the same amount of 92 million euros, representing a share of around 3.3% of total pledges, GEF-6 covers the period July 2014 – June 2018 and GEF-7 covers the period July 2018 – June 2022.

Since 2015, Italy is a contributor to the **Adaptation Fund (AF)** through IMELS. The AF provides finance to projects that help vulnerable communities in developing countries to adapt and build resilience to the effects of climate change while providing an innovative direct access modality that allows accredited national institutions in developing countries to access financing and manage projects directly. Since 2015, Italy provided contributions totaling 21 million euro, of which 12 million euro in the biennium 2017-2018. These contributions helped the Fund to assist vulnerable communities' efforts in developing countries to adapt to climate change and surpassing its fundraising target of USD 90 million per year both in 2017 and 2018. Furthermore, IMELS is working in synergy with the Adaptation Fund Secretariat and National Implementing Agencies in order to scale up AF's projects through its bilateral cooperation programmes and activities. In the context of the bilateral cooperation with the Ministry of Environment, Forest and Climate Change of Ethiopia, in fact, IMELS provides USD 4.2 million of funding to support the implementation of a 3 years' project called "Climate Smart Integrated Rural Development", as a complementary initiative that builds on the project financed by the Adaptation Fund in 2017 in Ethiopia. In particular, its main purpose is to manage the risks from recurring droughts, floods, both from current risks and under future climate change – through an integrated water, agriculture and natural resource management approach. This approach is complemented with a climate resilient livelihoods diversification programme. The project is targeted in two climate sensitive and vulnerable pastoralist areas of Ethiopia such as Afar and Somali regions.

Italy joined the **Climate & Clean Air Coalition (CCAC)** in 2012 with the intention to support actions and initiatives to reduce Short-Lived Climate Pollutants and to contribute to combat climate change, improve air quality and protect human health in the short-medium term.

Additionally to the funding allocated in previous years, IMELS contributed in 2017 to the CCAC Trust Fund to provide support the CCAC 2020 Five-years Strategy and the Secretariat, indicating as main areas of interest and specific Initiatives: HFC, Urban Health, addressing SLCPs from agriculture, Oil and Gas.

As member of the CCAC, IMELS supported the initiatives participating to Working Groups and to the definition and adoption of the political *Communiques* at the CCAC High Level Assembly meetings in 2017 and 2018.

The **Project IACSA (International Alliance on Climate-Smart Agriculture)**, jointly initiated by **IMELS and FAO** in March 2014, has the objective to support the establishment and functioning of the Global Alliance on Climate Smart Agriculture (GACSA).

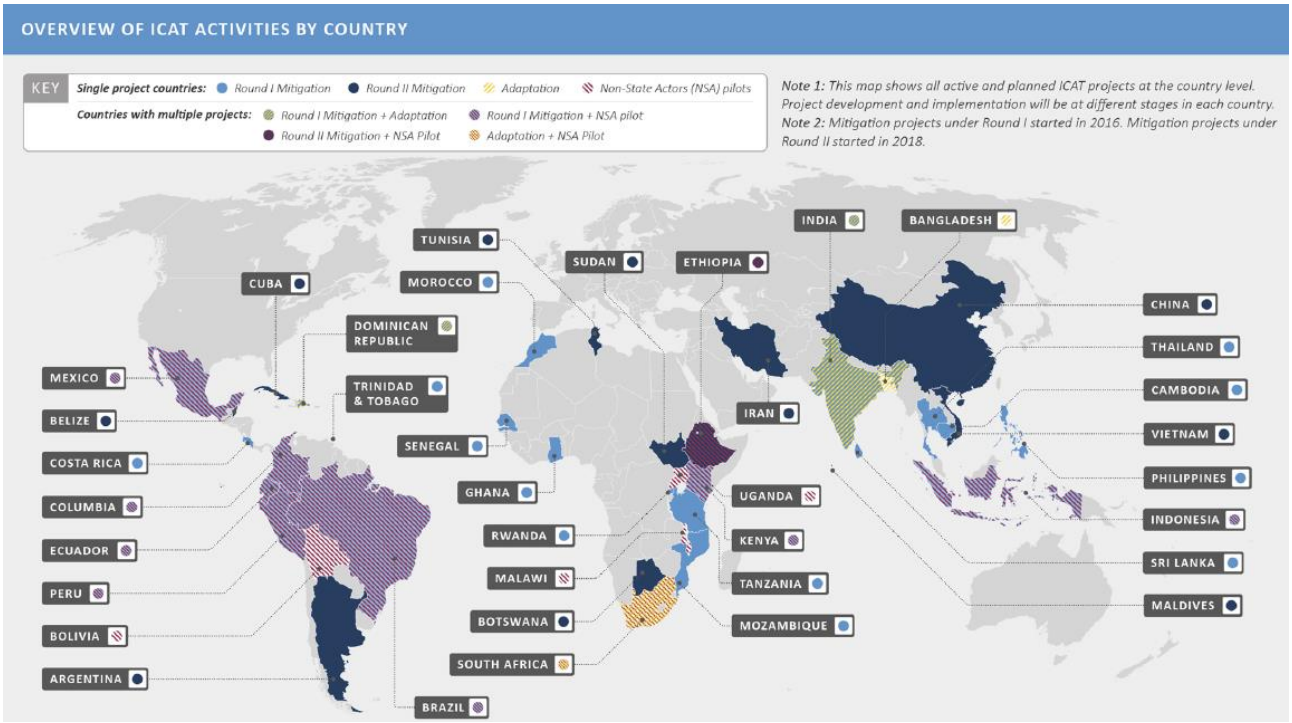
The GACSA was launched on 23rd September 2014 at the UN Climate Summit in New York. It is a voluntary and inclusive platform facilitating dialogue, knowledge exchange and learning, partnerships across and within diverse interest groups, including Governments, International Organizations, NGOs, farmers associations, practitioners and other stakeholders to accelerate up-take and practicing of the Climate Smart Agriculture (CSA). The Climate Smart Agriculture is an approach developed by FAO to developing the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change. CSA integrates the dimensions of sustainable development by jointly addressing food security and climate challenge in 3 main pillars: a) sustainably increasing agricultural productivity, incomes and livelihoods; b) adapting and building resilience to climate change; c) reducing and/or removing greenhouse gas emissions, where possible.

GACSA brings together more than 280 members, including 23 Governments. The Alliance is aimed to generate knowledge and mobilize technical support and financing to allow countries to adopt and implement CSA.

The IACSA Project contributes to the GACSA by supporting the governance of the GACSA and the relevant Action Groups in providing policy support, fostering investment, mobilizing funds and developing knowledge, tools and methodologies to support the identification of the appropriate farming systems, practices, technologies that address food security and climate change, at the national and local level. During the year 2017-2018, project milestones included, among others, the finalization of prefeasibility Studies on CSA in 3 developing countries (Ethiopia, Ecuador, Botswana); the elaboration of an Italian Case Study on Climate

Smart Agriculture; the contribution with the FAO to the production of two e-learning courses on Water and on Soil and Land finalized the production of elaboration of a compendium on "Climate Smart Irrigation and three practice briefs; support to the participation of GACSA to international events, including the UNFCCC COP23 in Bonn 2017 and the Climate Week in NY in September 2017 and, for the year 2018, the organization of side events during COP24 in Katowice. In 2018, the project has been extended until 2020 to ensure continuation and follow up of activities.

Since November 2015, Italy is party and donor of the **Initiative Climate Action Transparency (ICAT)**. The Initiative is working with developing countries to strengthen capacity to assess climate actions (in the context of their NDC's) and report their progress in line with the Paris Agreement, based on individual country needs.
The Initiative supports in-country capacity development programmes through training modules on measurement, reporting and verification (MRV) of policies and actions, and knowledge sharing of good practice and lessons learned.
The following map highlights the status of implementation of ICAT activities during 2015-2018. In particular until December 2018, 31 countries has been invited to join the Initiative as detailed below.




IMELS has contributed with 5 million Euro to the ICAT trust fund, managed by UNOPS, to assist 11 beneficiary countries (Argentina, Belize, China, Cuba, Ethiopia, Iran, Maldives, Ruanda, Sudan, Tunisia, Vietnam). ISPRA, the technical branch of IMELS, is involved as ICAT implementing partner both in the definition of the methodological toolbox and in the in-country capacity building activities that will carried on during years 2020/2021.

CBIT aims to assist developing countries in meeting the enhanced requirements for transparency of action and support under the Paris Agreement and it supports national institutions to plan, coordinate, implement and monitor policies, strategies and programs to enhance transparency and report on progress made in implementing Nationally Determined Contributions (NDCs). Moreover, CBIT provides access to tools and applications to facilitate the use of improved methodologies and guidelines, as well as country-specific training. In addition, it facilitates activities such as peer exchange programs to help share experiences and expertise between countries.

**The Global Bioenergy Partnership (GBEP)** was established to implement the commitments taken by the G8 Gleneagles Plan of Action in 2005. The Partnership is a forum where voluntary cooperation works towards consensus in the areas of the sustainability of bioenergy and its contribution to climate change mitigation. It brings together public, private and civil society stakeholders and focuses its activities in three strategic areas: Sustainable Development, Climate Change, Food and Energy Security.

Italy supports the functioning and activities of the GBEP since 2006 through a Memorandum of Understanding with the FAO which was extended until the end of 2020. Furthermore, Italy was entrusted by the GBEP Steering Committee at its 19th meeting in 2016 to continue its co-chairing function of the GBEP together with Brazil. The GBEP Secretariat, hosted at FAO Headquarters in Rome with the support of Italy, is the principal coordinator of the Partnership communications and activities. During the biennium 2017-2018, several activities have been developed by the GBEP partnership also through its specific Working Groups and Task Forces.

The Working Group on *Capacity Building for Sustainable Bioenergy* organized several workshops and activities aimed at raising awareness and data on the implementation of the 24 voluntary sustainability indicators for bioenergy developed by the GBEP since 2011, which represent a unique tool to inform the development of national bioenergy policies and programmes, monitor the impact of these policies and programmes, as well as interpret and respond to the environmental, social and economic impacts of their bioenergy production and use. The GBEP work on sustainability indicators responds directly to the mandates GBEP received from G7/G8 Leaders in the last few years and facilitates the implementation of Agenda 21, the Johannesburg Plan of Implementation and of the Sustainable Development Goals (SDGs). It also represents a contribution to the Sustainable Energy for All Initiative (SE4All). The GBEP indicators are currently in the implementation phase. Up to December 2018, the GBEP indicators had been implemented in 12 countries (Argentina, Colombia, Egypt, Germany, Ghana, Indonesia, Italy, Jamaica, Japan, Netherlands, Paraguay and Viet Nam).

New capacity building activities were launched by GBEP during the last biennium: in November 2017 GBEP established an "Activity Group on Biogas" focusing on the development of a stocktaking report on biogas development in the different regions of the world, which developed a document on biogas that was circulated to GBEP Partners and Observers for inputs. In November 2018 GBEP established also an "Activity Group on Advanced Liquid Biofuels".

In order to provide a framework of cooperation and facilitate and strengthen collaboration in areas of climate change, forestry and forest-related sectors such as agriculture and energy, with the ultimate goal of enhancing, strengthening and accelerating sustainable forest management, in July 2017, IMELS signed a new agreement with UNDP regarding the **REDD+ implementation** and **REDD+ results**. The specific areas of cooperation are Ecuador, Ghana and Myanmar and activities are the following:

- Foster a close collaboration to support the countries in engaging in REDD+ under the UNFCCC, in enhancing capacities for the implementation of REDD+ and related safeguards, in addressing the drivers of deforestation and forest degradation, in creating and enhancing institutional capacity in the forestry, environment sector and green growth based on technical cooperation, training, research / knowledge and technological support and transfer;
- Support the countries to submit REDD+ projects and programmes to the GCF, as well as their implementation, through the provision of skills, expert knowledge transfer, best practices, political support and international recognition for efforts made and results achieved;
- Support the countries in coordinating the negotiations and implementation of public-private partnerships and agreements with international corporations involved in commodities supply chains and forest-related sectors.

### *Regional cooperation*

Following the signature of the Paris Agreement, the Government of Italy is working to fight climate change by supporting the **Sustainable Energy Fund for Africa (SEFA)** and the **African Climate Change Fund (ACCF)**, hosted and managed by the African Development Bank.

In late December 2015, the Italian Ministry of Environment, Land and Sea joined the **Sustainable Energy Fund for Africa (SEFA)** with a total contribution of 7.4 million Euro to support small and medium-scale private sector projects in the renewable energy and energy efficiency sectors in Africa. The Multidonor Fund helps projects develop bankable investment opportunities and thus enables sponsors to attract equity and debt financing for successful implementation through the Africa Renewable Energy Fund (AREF). The Fund also provides enabling environment grants to improve the regulatory and policy framework for investments in sustainable energy.

SEFA has so far been able to support the private sector through 3 main financial instruments:

- grants to support early stage project development,
- equity invested through the Fund AREF that invest in clean energy projects,
- grants to support and strengthen the regulatory environment of public/government entities, making them more efficient in attracting private sector investment.

SEFA is supposed to end its life at the end of 2019 and negotiations are ongoing to transform SEFA in SEFA Special Fund, with the entrance of new donors, the replenishment on behalf of existing ones and the broadening of its focus and its financial tools.

Such restructuring implies a review of the fund governance, an augmented shooting power in terms of financeable projects in target and size, and a wide range of financial tools which spans from reimbursable and non-reimbursable grants in different forms, guarantees, concessional debt and equity.

Main target areas of SEFA Special Fund would be:

- Green baseload
- Green mini-grid
- Energy efficiency

In early 2017, the Italian Ministry for the Environment, Land and Sea made a contribution of 4.7 million Euro to support the **Africa Climate Change Fund (ACCF)**. The Italian commitment has triggered the conversion of the ACCF to a multi-donor trust fund and allowed to launch the second call for proposals to strengthen access to climate finance and pilot a variety of innovative adaptation approaches in line with African countries' nationally determined contributions (NDCs) and national adaptation plans (NAPs). The Fund's pipeline will expand its operations to respond to evolving climate finance needs on the continent, including into areas of opportunity including engaging private sector in financing adaptation, scaling up local and municipal climate finance, empowering women and youth entrepreneurs in low-carbon sectors, and piloting innovations in climate-smart agriculture.

With the aim of reducing the financial, technical and institutional obstacles to the development of geothermal energy in the five eastern Caribbean countries with the greatest potential: Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines, in 2017 IMELS decided to co-finance, through an Agreement with the **Inter-American Development Bank (IDB),** the Sustainable Energy Facility for the Easter Caribbean Expanded (SEF-Expanded). The project also aims to strengthen the institutional competences of the governments of the Islands and of the Caribbean Development Bank. The result will be a greater ability to attract private investments in the geothermal sector and the development of public-private partnerships.

On a multilateral level, Italy is the European Leading Country for the EU-Central **Asian Platform on Environment and Water Cooperation**, a pillar of the 2007 "EU Strategy for a New Partnership with Central Asia". The strategy defined the priorities for EU development aid and diplomatic activity in the region. These include responding to security threats, protecting human rights, promoting economic development, developing transport and energy links, and ensuring environmental protection.

The Platform for Environment and Water Cooperation is the means through which the EU supports Central Asian cooperation on water, environment and climate change, bringing together Central Asian and international stakeholders.

Within the Platform, the Italian Ministry of Environment, Land and Sea, chairs the EU-Central Asia Working Group on Environment and Climate Change, which holds regular meetings and is supported by a Secretariat financed by the EU. Up to 2018, 8 Working Group Meetings chaired by IMELS and 5 EU-Central Asia High-Level Conferences on Environment and Water Cooperation, with Italy as Leading EU Country, took place.

### *6.2.2 Bilateral cooperation with developing countries*

Inspired by the objectives of the Paris Agreement and its long-term goals as well as the Sustainable Development Goals, Italy is strongly engaged to continue the activities mentioned in the Seventh National Communication. Taking into account the initiatives undertaken in the previous years and the new commitments under the UNFCCC, the bilateral cooperation stretches across all continents and regions: **Africa, Mediterranean region, Small Islands Developing States, Asia, Central and Eastern European and Central and Latin America**. Since 2015, particular focus has been given to the countries that are most vulnerable to the effects of climate change such as **the African countries and the Small Islands Developing States**.

Italy cooperates through projects and activities both specifically addressed to combat climate change and mainstreaming climate, biodiversity and land degradation into those activities. In terms of figures, climate-related bilateral cooperation with developing countries[46] in the last biennium 2017-2018 amounts to **665,53 million USD**. This figure includes flows addressed to Least Developed Countries[47], who benefit of **411,9 million USD**[48].

In particular, it is worth mentioning the IMELS' will to strengthen the co-operation activities with the **Sahel Countries.** The IMELS's co-operation policy in the Sahel, to be drawn up in partnership with the countries concerned, will be geared towards tackling the climate change effects, the root causes of the extreme poverty and towards creating the grass-root conditions for economic opportunity and human development to flourish. In this connection, some preliminary contacts with the above mentioned Countries has been initiated, in order to develop bilateral agreements during 2019.

The following paragraphs provide a description of the most relevant initiatives foreseen by the bilateral cooperation in the biennial 2017-18 as a result of the signature of 21 new MoU's and the implementation of project proposals developed within the 31 MoU's already signed in the biennial 2015-2016.

The activities reflected the needs and priorities of developing countries' Counterparts included the Nationally Determined Contributions (NDCs) and other relevant climate change and development strategies and enhanced the country ownership.

All projects and programs financed in this context are proposed by developing countries and reflect priorities and objectives.

#### *Cooperation on climate change in the Asian region*

IMELS started the Sino-Italian Cooperation Program for Environmental Protection (SICP) with the **People's Republic of China**, more than eighteen years ago. In this way, it was possible to develop over 200 project lines, for the environmental monitoring and management, mostly contributing at strengthening Chinese

[46] Definition according to the DAC list of ODA recipients, 2018.
[47] Official list of LDCs according to United Nations Department of Economic and Social Affairs.
[48] All figures exclude private grants.

national and local institutions, protecting and conserving natural resources, water management, waste-to-energy, developing renewable energy sources, energy efficiency, sustainable urban planning and eco-building, environmental protection in the poorest regions, developing low-emission transport systems and technologies, sustainable agriculture, biodiversity protection and forest management. About 66 projects were strictly related to climate change activities and objectives of the Paris Agreement and the United Nations Convention on Climate Change, while the rest were useful to create an enabling environment for mitigation and adaptation measures.

Project formulation has been entrusted to a permanent Sino-Italian task force made up of experts from IMELS, Chinese Ministries and Agencies, Scientific Institutions, Italian and Chinese Universities. This task force constitutes the Program Management Offices (PMO) based in Beijing and Shanghai. In the timeframe between 2017 and 2018, the following projects were undertaken in the field of climate change:

- The establishment of the Sino-Italian Center for Sustainability (SICES) supported by IMELS and the University of Tongji (Tongji). The Center aims at enhancing the collaboration between Italian Research centers and Chinese Research center on Greener Cities, to promote research and capacity building in Climate Change Adaptation/Mitigation, Energy Efficiency/Renewable Energy, Resource Efficiency/Circular Economy sectors.
- Under the Memorandum of Understanding between IMELS and the People's Government of Beijing Municipality, signed in 2017, four projects were developed between 2017 and 2018 on sustainable development, air monitoring, pollution prevention and control – especially regarding the urban heating & cooling sector – petrochemical and other key industrial sectors, as well as soil and water monitoring and environmental radiation.

| **Institution** | **Project title** | **Period** | **Budget (€)** |
|---|---|---|---|
| Beijing Municipal Bureau of Ecology and Environment<br><br>(Beijing BEE) | Technical Arrangement on Beijing Electromagnetic Radiation Monitoring Network Project | 2018 | 204,600 |
| Beijing Municipal Bureau of Ecology and Environment<br><br>(Beijing BEE) | "Low-nitrogen gas-fired boiler pilot Project" to promote low nitrogen gas-fired boilers，based on the scientific analysis of monitoring data and operating data | 2017 | 850,000 |
| Beijing Municipal Bureau of Ecology and Environment<br><br>(Beijing BEE) | "Particular Matters Monitoring Project" to enhance Beijing Municipality's capacity for air quality monitoring and pollution monitoring and control in particular on fine particles (PM2.5) | 2017-2018 | 547,200 |
| Beijing Municipal Bureau of Ecology and Environment<br><br>(Beijing BEE) | Tongzhou Water Environment Evaluation and Strategy (TWEES) to optimize water environment management strategies of Tongzhou District based on the practices and experiences of EU and Italy | 2017-2018 | 560,100 |

Since 2003, IMELS has been promoting an Advanced Training Program on the various issues of environmental management and sustainable development, targeted at technicians, academics, young professionals and decision-makers in Chinese administrations, universities and enterprises; an important aim of the training program was the capacity building about potential climate change mitigation and adaption actions. Since 2003 more than 200 Italian companies were visited during about 650 study visits. Over 350 public and private institutions were involved, with a total of about 1000 speakers.

In 2018, over 180 participants from all the provinces of China took part in the training program, with a total of 11 courses (in Italy and China).

In the table below are summarized the recipient institutions of the trainings, the contents, the number of trainees and the amount of resources allocated on each training.

| Recipient Institution | Content of the training | No. of trainees | Budget (€) | Period | Place |
|---|---|---|---|---|---|
| Beijing Environmental Protection Bureau | Environmental Pollution Control | 20 high level staff or technicians responsible for environmental management | 113,750 | 2018 | Italy |
| Ministry of Industry and Information Technology | Energy Efficiency in Industry | 40 officials, experts and senior business leaders | 227,500 | 2018 | Italy |
| Shanghai Environmental Protection Bureau | Air Quality Control and Urban Wastes Disposal: Technical and Management Planning Aspects | 20 high level staff or technicians responsible for environmental management | 113,750 | 2018 | Italy |
| Ministry of Science and Technology | Innovative Science Parks and Research/Industry Collaborations | 38 officials from central and local governments, experts from R&D institutions, managers from organizations and enterprises. | 170,625 | 2018 | China and Italy |
| Ministry of Ecology and Environment - Foreign Economic Cooperation Office | Environmental Protection and Sustainable Development in Emission Permits Management | 15 members of central and provincial MEE and other organizations selected by MEE | 113,750 | 2018 | Italy |
| Ministry of Ecology and Environment - Department of Climate Change (*) | Climate Scenarios, Adaptation, and Mitigation Policies | 12 members of central and provincial MEE and other organizations selected by MEE | 97,000 | 2018 | Italy |

Subsequently, during 2018, environmental cooperation agreements have involved other countries in the region. In particular, agreements with the Ministries of the Federal Democratic Republic of Ethiopia, the Republic of the Djibouti, the Union of Comoros, the Kingdom of Lesotho, the Democratic Republic of the Congo, the Republic of Rwanda, the Republic of South Africa, the Republic of Sudan, the Kingdom of Swaziland,

### *Socialist Republic of Viet Nam*

On June 2018 IMELS signed a Memorandum of Understanding on cooperation in the field of mitigation and adaptation to climate change with the Ministry of Natural Resources and Environment of Viet Nam.

At the first JC Meeting in Katowice in December 2018, the following thematic areas of cooperation have been identified as priorities: climate change adaptation and mitigation, remote sensing application, water resources management.

### *India*

On October 2017, IMELS and the Ministry for the Environment and the New and Renewable Energy of the Indian Republic have undersigned a Memorandum of Agreement for the cooperation in the energy sector. The Memorandum is focused on two main areas of cooperation: promotion of the production and utilization of renewable energy from solar power, wind energy, hydroelectric and biomass; elaboration of new technologies in the energy field, especially for the energy storage. The budget for the projects will be decided on case by case basis. Until now, no project initiative has been approved.

### *Pacific Small Island Developing States*

The Partnership with the Pacific Small Island Developing States (PSIDS) has been launched more than ten years ago to implement a cooperation programme for addressing the key global challenges related to mitigation and adaptation to climate change, protection from vulnerability to extreme climate variability and mitigation of harmful emissions generated by energy utilization.

The Memorandum of Understanding between IMELS and the Governments of the Pacific Small Island Developing States participating to the project "Co-operation on climate change and on the clean development mechanism under article 12 of the Kyoto protocol", was signed in New York on 11 May 2007 and subsequently extended and signed by all Parties and currently includes among donors: the Italian Ministry for the Environment, Land and Sea (IMELS), the Ministry of Foreign Affairs and International Cooperation of the Italian Republic, the Grand Duchy of Luxembourg, the Ministry of Foreign Affairs and Cooperation of Spain, the Federal Ministry for Europe, Integration and International Affairs of the Republic of Austria.

Pacific Small Island Developing States participating to the programme are: the Republic of the Fiji Islands, the Republic of Kiribati, the Republic of the Marshall Islands, the Federated States of Micronesia, the Republic of Nauru, the Republic of Palau, the Independent State of Papua New Guinea, the Independent State of Samoa, the Solomon Islands, the Kingdom of Tonga, Tuvalu, and the Republic of Vanuatu.

The main component of the mitigation activities of the programme, includes the development and dissemination of the use of rural renewable energies sources and biofuels to meet the energy security of the Pacific Small Island countries, reduction of greenhouse gases emission and promotion of sustainable transport. Moreover, the programme intends to strengthen national capacities also through capacity-building and technology transfer activities for the establishment of national energy policies and strategies, as well as markets, develop specialized human resources and work closely with communities, so as to ensure sustainability.

Further, the adaptation activities aimed to support the Disaster Risk Reduction efforts of the Pacific SIDS as a means to decrease their vulnerability to the impact of severe weather occurrences and increase their capacity to adapt to increasingly extreme situations caused by climate change, inter alia supporting the protection and conservation of marine and terrestrial ecosystems and biodiversity as a means to increase the resilience of the Pacific.

### *Project implementation 2017-2018*

The 15 projects ongoing or concluded, agreed by the Joint Committee (JC) established under the MoU, in the period 2017-2018 are the following:

***ENERGY-BASED ADAPTATION***

1) **Sustainable programme for widespread rural electrification (Solomon Islands)**. The main objective is to reach out to rural communities in terms of provision of sustainable and reliable electricity supply. It will combine electrification initiatives with technology transfer activities. The installation of small

off-grid plants for rural electrification and the creation of two Youth Micro-Enterprises (YME) to provide a maintenance service for solar plants. The project installed 16 plants in two provinces of the Solomon Islands involving almost 3.000 people who lived in absence of essential energy services. In addition, 30 people, among teachers and students, were trained on selection and maintenance of a PV system.

2) **Planning for electricity network in Solomon Islands (Solomon Islands)**. The main objective were to enable finding, through a simulation model, the more efficient way to connect, on the field, different nodes inside electricity grid or networks. In particular the simulation software provided with: (i) electricity network constraint study to identify quickly areas of reinforcements; (ii) reliability and network optimization with maintenance of key assets; (iii) load flow analysis for network extensions, protection study and network loss study. Furthermore the project produced a case study for 2 sites, including a business and feasibility study, that supported SP boards to proceed with its plan to install additional 37 mini solar hybrid systems in Guadalcanal Province and in the other Outer Islands.

3) **PV Solar Off Grid systems for fish centers outer islands (Kiribati) – Phase II**. The main activity is to install 4 kW solar off-grid Solar power systems (substituting Diesel fuel) for the Fish Centers in 10 outer islands (Butaritari Abaiang, North Tarawa, Maiana, Aranuka, Abemama, Tabiteuea North, Beru, Nikunau and BanabaTamana).

4) Grid-Tied photovoltaic power systems for Chuuk State. is aiming at installing around 100 kW in three public schools and in the parking area of the Health department. The PV systems installed will be grid-tied.

***CAPACITY BUILDING***

5) **Fellowship for capacity building on climate change and oceans (Fiji)**. The main objective is to enable the Fellows to take the acquired knowledge and skills and further strengthen their respective political, legal, and/or technical capacities attuned to the regional and international interests of the PSIDS.

6) **2018 Tonga fellowship on the environment and Ocean (TFEO)**. The main objective is to strengthen the civil servants' negotiating capacity so as to improve their engagement in international and regional fora providing these professionals with useful skills will contribute to promoting and safeguarding Tonga's national interests through foreign policy pursuits.

***WATER AND FOOD SECURITY***

7) **Increasing Palau's resilience to extreme drought events: taking action for long term adaptation to the impacts of climate change (Palau)**. The main objective was to build Palau's resilience to extreme drought events in particular to prolonged period due to the exacerbated effects of the ENSO Oscillation as for example the recent severe drought that led Palau to declare a State of Emergency in March 2016. The objectives of the work are: 1) To identify and develop new ground water sources for rural areas of Palau; and 2) To prepare and launch an educational program that promotes proper water conservation and management in communities, business and schools throughout Palau.

8) **Irrigation for a resilient and sustainable agriculture (Vanuatu)**. The main objective is to realize a high efficiency drip irrigation system, powered by solar energy, in order to promote local agriculture resilience to the impacts of climate change in particular during the dry seasons prolonged by the extreme cycles (El Nino and La Nina) of the El Nino Southern Oscillation (ENSO). Each system will consist of a well and pipes for irrigation, a submersible pump, a storage tank for water supply and a PV modules with inverters for the electrification of the pump. System has been planned to full cover the daily water demand during dry season (almost 10 m3/day/ha). The six sites chosen for the installation of the irrigation systems are located on the islands of Tanna, Efate and Santo, for a total area covered by the project of 10 hectares.

9) e 10) **Household Water Storage Project (Nauru) Phase II and III**. The main objective is to meet the ever increasing demand for potable water in Nauru, due to its changing climatic variability and continuous population growth, within a larger local strategic approach to securing Nauru's National water supply. Following the National census of 2011, 260 of the 1652 household dwellings on the island represented the most vulnerable of the requiring assistance.

11) Enhancing water security and climate resilient food (Micronesia). The objectives are mainly focused on saving water and on the efficient use of water, in particular in the agricultural sector.

***MARINE PROTECTED AREAS AND OCEAN-BASED ECONOMY***

12) **Strengthening protected area management in the Kingdom of Tonga (Tonga).** Projects aim at establishing 15 Marine Managed Areas (5MPAs and 10 SMAs). An Habitat Mapping to detect and quantify coral reef ecosystems and associated coastal environments and relatives carbon stocks.

13) **Strengthening of Phoenix Islands Protected Area & creation of related Marine Protected Areas in Kiribati (Kiribati)**. The main objective of the project is to ensure that laws and all key decisions endorsed by Cabinet over the years are not at jeopardized through the implementation of the following activities: (i) build a "Bring PIPA to people Education Dream Center" in the capital Tarawa; (ii) a Strategic Education and Public Outreach campaign tailored to the opportunities, realities and constraints of Kiribati; (iii) Institutional capacity building for the Kiribati Government at all levels including public officials; (iv) Creation of community-managed pilot Marine Protected Areas on the outer islands; (v) Scholarship programme on marine biology/ocean science (vi) Habitat mapping.

14) **Palau national marine sanctuary education and awareness (Palau)**. The project included an awareness campaign and in part capacity building involving the political class, local populations as well as tourists through a payment system for ecosystem services dedicated to future generations of Palau.

***EARLY WARNING SYSTEM***

15) **Building Infrastructure Resilience (Marshall Islands)**. The project is implemented in the framework of the Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management of the Marshall Islands with the dual objective of improving national planning through zoning for risk management and establishing a center for data collection and management of geospatial information useful for planning. The project's outcome have been used as the baseline scenario of a larger project approved by the Green Climate Fund and the Italian contribution also highlighted.

| **n.** | **State** | **Project's title** | **JC** | **budget (UDS)** |
|---|---|---|---|---|
| **ENERGY-BASED ADAPTATION** | | | | |
| 1 | Micronesia | Grid-Tied photovoltaic power systems for Chuuk State | JC4 (2009) | 700,000 |
| 2 | Kiribati | Outer Island Fish Center Solar Panel System Phase 2 | JC11 (2017) | 764,838 |
| 3 | Solomon | Sustainable Program of a widespread rural electrification for water and energy security | JC10 (2016) | 956,129 |
| 4 | Solomon | Planning for electricity network in Solomon Islands | JC10 (2016) | 245,000 |
| **CAPACITY BUILDING** | | | | |
| 5 | Fiji | Fellowship for Capacity Building on Climate Change and Oceans | JC10 (2016) | 83,809 |

| | | | | |
|---|---|---|---|---|
| 6 | Tonga | Strengthening of National Capacity For the Follow-up to, and Implementation of the Paris Agreement, the Sustainable Development Goals and related Major International Agreements | JC11 (2017) | 373,352 |
| **WATER AND FOOD SECURITY** | | | | |
| 7 | Micronesia | Enhancing water security and climate resilient food systems for the displaced atoll communities in yap | JC11 (2017) | 948,750 |
| 8 | Nauru | Household Water Storage Phase 2- Household Water Storage Phase 3 | JC8 (2015) JC10 (2016) | 300,000 |
| 9 | Nauru | | | 45,522 |
| 10 | Palau | Increasing Palau's Resilient water to extreme drought events. Taking Action for long term adaptation to the impacts of climate change | JC10 (2016) | 800,000 |
| 11 | Vanuatu | Irrigation for a resilient and sustainable agriculture | JC10 (2016) | 244,336 |
| **MARINE PROTECTED AREAS AND OCEAN-BASED ECONOMY** | | | | |
| 12 | Palau | Palau National Marine Sanctuary: Education and Awareness | JC11 (2017) | 400,000 |
| 13 | Kiribati | Strengthening of Phoenix Islands Protected Area & Creation of related Marine Protected Areas in Kiribati | JC11 (2017) | 730,600 |
| 14 | Tonga | Strengthening Protected Area Management in the Kingdom of Tonga | JC11 (2017) | 746,650 |
| **EARLY WARNING SYSTEM** | | | | |
| 15 | Marshall | Building Infrastructure Resilience | JC9 (2016) | 497,794 |

### *Maldives*

In 2015, IMELS signed a Memorandum of Understanding on climate change, vulnerability, risk assessment adaptation and mitigation, with the Ministry of the Environment and Energy of the Republic of Maldives. Between 2017 and 2018 n.5 projects have been implemented, namely:

*"Development of a sea state forecasting system for the Maldivian Archipelago" project*

2017 - 2018
The main objective is to develop of an operational wave forecast system through two main activities: the development and verification of the regional wave model and the creation of an operating system that produces daily forecasts on the state of the sea.

Budget: €605,270

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| *AOSIS Fellowship Programme – Capacity building*<br><br>2017 - 2018<br>The is to increase the capacity of AOSIS Member Countries (PSIDs, CARICOM, AIMS: Africa, India Ocean, Mediterranean and South China Sea) to engage in international negotiations, diplomacy and international and domestic policy development on Climate Change and related topics<br><br>Budget: € 842,000 |
| *"Ocean Energy Resources Assessment for Maldives" project*<br><br>2017 – 2018<br>The main objective of the Project is to perform a detailed assessment of the energy potential residing in the marine currents in the Maldivian archipelago, and to individuate technological solutions to exploit it.<br>Budget : € 866,245 |
| *"Enhancing weather and climate monitoring and data management capacity of Maldives Meteorological Service (MMS) for reducing vulnerabilities of climate change in the Maldives" project*<br><br>2017 – 2018<br>The project aims to strengthen the meteorological monitoring network, early warning and disaster prevention systems. It consists of in the installation of 25 Automatic Weather Stations (AWSs), that will measure the following parameters: air temperature, relative humidity, air pressure, wind direction and speed, cumulative rain and rain intensity.<br>budget: € 1,341,750 |
| *"Implementation of an Integrated Meteorological and Climatological Information and Decision Support System at the Maldives Meteorological Service"*<br>2018<br>The main objective of this project is to enhance the national institutional capacity for decision making and management of the implementation of adaptation measures and actions to address climate change and variability in the territory of the Maldives to reduce the impact of weather-climatic hazards and related risks In particular, the project aims at designing a unified meteorological and climatological information system and decision support system able to integrate the Maldives Meteorological Services (MMS) current observing facilities, including satellite image receiving system, automatic weather stations etc.<br>Budget: € 903,745 |

### *Cooperation in the Middle East and North Africa region*

In Mena Region, IMELS' cooperation has strengthen its effort to address all 2030 Agenda priority sectors relating to climate change. IMELS' cooperation in the region is coherent with the national and international environmental objectives.

Projects are mainly related to support Partners in implementing their NDC's by operating on energy, natural resources management, green jobs, climate smart agriculture, biodiversity.

Capacity building, institutional building and technology transfer are the three pillars of IMELS' action in MENA Region.

### *Egypt*

IMELS signed on December 2015 a MoU with the Egyptian Ministry of the Environment with the aim to promote sustainable development and protecting the environment. During the reference period, new initiatives are under discussion.

### *Lebanon*

On July 2016, IMELS signed a MoU with the Lebanese Center for Energy Conservation (LCEC) with the aim to promote sustainable development.

- Project: *Heat Pump project Phase 1***,** approved during the second JC held in Beirut on 13 December 2016
  Duration: December 2016 - December 2020

  Total Budget: €2,550,831

  IMELS: €1,976,766

This project provides support to the Lebanese government in addressing the climate change mitigation challenges presented in the INDC under the UNFCCC by introducing "heat pump" technologies in the heating, domestic hot water production and cooling sectors (for residential and tertiary applications mainly) through know-how and technology transfer. This support will include capacity building and technology transfer activities.

- Project: *Maximizing energy savings from energy efficient home appliances*, approved during the third JC held in Rome, on 1st August 2018
  Duration: August 2018- August 2021

  Total Budget: €1,799,375

  IMELS: €1,619,375

The project emerges in response to the latest NEEAP (National Energy Efficiency Action Plan 2016-2020) that set a target of 1.5 TWh of savings to be achieved by 2020. This includes 149 GWh of savings in buildings, of which 55.6 GWh from energy efficient equipment. In order to achieve these savings, the LCEC has defined various energy efficiency initiatives to be implemented for the period 2016- 2020; one of them is the use of more energy efficient equipment. The project consists of the distribution of rebates to end-users directly or through local retailer shops to incentivize the purchase of highly energy-efficient equipment. The new financing mechanism targets directly end-users and increases the environmental awareness of the wider public.

On 12 December 2016, IMELS signed a MoU with Central Bank of Lebanon on Sustainable Development Finance for a value of 5 million euros in order to promote a financial mechanism to facilitate, through the Lebanese commercial banking system, an easy financing line for projects in the field of renewable energies and energy saving which could also attract Italian SME's with competencies in such field, fostering the involvement of the private sector in general.

### *Morocco*

Through an agreement signed in 2012 with "Agence Marocaine pour l'Efficacité Energétique (AMEE)" IMELS supported the project: Energy efficiency of the Ibn Rochd University Hospital Center in Casablanca.

The project ended in June 2018 and provided the Hospital with the installation and disposal of solar heating plants by guarantying easy access to hot water.

The objective of the project was reducing the use of electricity through the improvement of energy efficiency facilities. To this end, the project supported the procurement of 400 solar panels, installed on the roofs of the hospital, that reduced the energy consumption and allowed the production of domestic hot water in many hospitalization wards, including that of pediatrics, traumatology, hematology and psychiatry and in the kitchens.

The project also envisaged a component of on-site training for the technicians of the Casablanca hospital, in order to guarantee the proper and efficient maintenance of the systems over time.

The 21st of April 2016 a MoU has been signed between IMELS and the Ministry delegate in charge of Environment of the Kingdom of Morocco - SEDD, with the aim to promote sustainable development initiatives. During the reference period, SEDD and IMELS supervised the implementation of the following approved projects:

- Project: *Programme intégré d'éducation à l'environnement et au développement durable dans les établissements scolaires,* approved during the second JC held in Rabat on 12 July 2017.
  Duration: October 2018 - November 2020

  Total Budget: € 2,072,727

  IMELS: € 327,000

The project is embedded in the National Program for Environmental Education launched by SEDD, in partnership with the local Ministry of Education, on raise awareness on sustainable development. The project aims to green schools by promoting the use of environmentally sound technologies.

- Project: *Mise en place de la filière de valorisation des déchets de construction et de démolition dans la Commune de Marrakech*, approved during the third JC held in Rome on 20 July 2018.
  Duration: July 2018 –January 2020

  Total Budget: € 337,983.92

  IMELS: € 62,284.78

The project aims to produce a feasibility study for the establishment of a Construction and Demolition Waste collection - pre-treatment and recovery center in the Marrakesh municipality.

The main activities are the preparation of a call for the selection of centre managers; assistance in the creation of the centre; organization of awareness seminars and capacity building on ecological waste management.

- Project: *Programme de Promotion de l'entreprenariat vert*, approved during the third JC held in Rome on 20 July 2018.
  Duration: July 2018 –July 2020

  Total Budget: €533,869.57

  IMELS: € 177,956.52

The project is dedicated to the promotion of the green entrepreneurship providing trainings opportunities for young entrepreneurs to evolve their projects and access to funding sources.

- Project: *Gestion intégrée des zones côtières de la Région Rabat-Salé-Kenitra,* approved on March 2019.
  Duration: February 2019- April 2021

  Total Budget: € 6,550,000

  IMELS: € 2,000,000

The project aims to develop the coastal management capacity of local population of the Rabat-Salé-Kénitra. The project will ensure the protection and sustainable use of coastal resources through and integrated approach.

### *Palestine*

On February 2016, IMELS and the Palestinian Environmental Quality Authority (EQA) signed a MoU with the aim to encourage and develop cooperation in the field of environmental protection and sustainable development.

- Project: *Revision and updating of the National Biodiversity Strategy of Palestine and related Action Plan and Preparing the Sixth National Report,* approved during the third JC held in Katowice on 13 December 2018
  Duration: April 2019 - April 2021

  Total Budget: € 241,000

  IMELS: € 203,250

The main objective of the project is to respond to the overall goals of both the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC).

The project will contribute to protect and conserve the Palestinian biodiversity and protected areas through updating the National Strategy on Biodiversity and its Action Plan (NSBAP), including the development of the Sixth National Report on biodiversity.

### *Tunisia*

On February 2016 IMELS and the Ministry of Energy, Mines and Renewable Energy (now Ministry of Industry and SMEs - MIPME ) signed a MoU with the aim to promote renewable energies and energy efficiency initiatives with an Italian contribution of 2 Million Euros.

During the reference period, MIPME and IMELS supervised the implementation of the following approved projects:

- Project: *Promo-Isol Establishment of a financing mechanism for the promotion of thermal insulation roofs in the individual housing - Fase I,* approved during the second JC on 5 December 2018.
  Duration: 24 months

  Budget: € 2,143,400

  IMELS: € 1,072,400

The project consists of the roofs' thermal insulation for 65 000 individual housing, of which two thirds of the existing housings and one third of the new housings. It has the objective of reducing heating and cooling energy consumption in individual homes, reducing significant GHG emissions and creating jobs.

- Project*: Implementation Project of a specialized unit in testing compliance and energy performance lighting devices,* approved during the second JC on 5 December 2018.
  Duration: 24 months

  Budget: € 549,700

  IMELS: € 393,700

The project is dedicated to support Tunisia's transition strategy towards efficient lighting and replacement of inefficient technologies will lead to energy savings and spending reduction.

- Project*: PROMO-FRIGO -Establishment of a financing mechanism to replace refrigerators older than 10 years – Phase I*, approved during the second JC on 5 December 2018.
  Duration: 24 months

Budget: € 1,549,700

IMELS: 513,700

The project is dedicated to pilot action to replace 10 000 refrigerators over the period of 2 years. The PROMO-FRIGO project consists of replacing 400,000 refrigerators over 10 years old in the period 2019-2023 with appliances of energy class 1 and 2, by encouraging households to rationalize their electricity consumption. This component complements the regulatory system concerning the obligation to certify and display the energy performance of domestic appliances (Decree No. 2004-2145 on September 2nd ,2004) launched by ANME with the support of the GEF since 2001.

On May 2018 IMELS and the Ministry of Agriculture, Water Resources and Fisheries of the Tunisian Republic (TMAWRF) signed a MoU on promoting sustainable development in the sector of Agriculture, Ecosystems, Water Resources and Fisheries.

During the reference period, TMAWRF and IMELS supervised the implementation of the following approved project:

- Project: *Renewable Energy for Agricultural and Rural Development***,** approved during the first JC held in Rome on 23 October 2018
  Duration: January 2019 – March 2021

  Budget: € 2,195,800

  IMELS: 1,973,000

The project aims to support the development of solar-powered systems for irrigation, water production and drinking water (water treatment through desalination and phytodepuration processes). A capacity-building component will be realized by training young graduates, with the aim of promoting the growth of small and medium enterprises in the renewable energy sector. The activities will involve the Regions of Kasserine, Gafsa, Sidi Bouzid, kairouan, Sousse and Sfax in the south-central part of the country.

### *Jordan*

On March 2018, IMELS and the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) signed a MoU in the field of climate change and sustainable development.

During the reference period, JREEEF and IMELS supervised the implementation of the following approved project:

- Project: *Installation of Solar PV Systems for Municipalities in the Hashemite Kingdom of Jordan*, approved on 13 February 2019.
  Duration: June 2019 - June 2022

  Total Budget: € 4,028,700

  IMELS: € 3,622,100

The objective of the project is to install up to 100 solar systems in public facilities, averaging 30 kilowatts peak (kWp) each, in Jordan's Municipalities.

The goal is to reduce electricity costs, while at the same time protecting the environment by reducing carbon emissions and fulfill Jordan's NDCs obligations according to UN/ Paris agreement.

### *Cooperation on climate change in the Sub-Saharan African region*

Africa continues to be a priority within the Italian development cooperation activities.

In 2017 and 2018, IMELS has signed MoU's with the Republic of Kenya, the Republic of Mali, the Republic of Mauritius, the Democratic Republic of Sao Tomé e Principe, the Republic of Seychelles, and the Republic of Zambia, with a total budget of €13 Million.

Furthermore several MoU's with the Republic of Burkina Faso, the Republic of Cote d'Ivoire, the Republic of Gabon, the Republic of Gambia, the Republic of Liberia, United Republic of Tanzania, the Republic of Namibia, the Republic of Mozambique, the Republic of Sierra Leone, and the Republic of Tanzania are still being negotiated.

In the following sub-paragraphs, details of the MoUs signed in 2017 and 2018 will be given.

#### *Kenya*

On January 2018, in Nairobi, IMELS and the Ministry of Energy and Oil of Kenya signed a Memorandum of Understanding for a cooperation in the field of sustainable energy, mitigation and adaptation to climate change.

The MOU identifies various cooperation objectives including:

- the support for the implementation, monitoring and communication of National Reduction Targets (NDCs) in the renewable energy sector;
- the support for the development and implementation of policies, strategies and programs on renewable, in order to achieve the emission reduction target set by the Republic of Kenya;
- promoting the production and use of renewable energy from geothermal, solar, wind, hydro and biomass;
- improvement of energy efficiency;
- technological development in the field of renewable for the electrification of rural areas through small plants or off-grid systems.

These objectives will be achieved through joint planning activities, capacity building, training, technology transfer and technical assistance. The participation of the private sector will also be promoted, also in partnership with the public sector, and the involvement of non-governmental organizations, especially in the renewable sector.

IMELS co-finances the activities approved under the MOU with a maximum amount of Euro 3 million.

#### *Mali*

IMELS and the Ministry of Environment and Sanitation of the Republic of Mali signed, on November 2017, in Bonn, a Memorandum of Understanding for the promotion of policies of fighting climate change and adapting to its effects).

The MOU identifies several areas of cooperation including:

- the collection, analysis and dissemination of data related to the observation of climate change and the measurement of its impact on potentially vulnerable economic sectors; the support for the implementation, monitoring, reporting and communication of Intended Nationally Determined Contributions (INDCs);
- the promotion of renewable energy and energy efficiency;
- the promotion of Climate-Smart Agriculture(CSA) practices;

- sustainable forest management, including the reduction of deforestation and forest degradation and the enhancement of afforestation / reforestation;
- sustainable and integrated water management.

On these issues, specific training activities are planned to strengthen skills, to give technical assistance and exchange of experts. Organization of workshops and dedicated seminars are also planned in order to encourage the involvement of the private sector and cooperation between universities and research centers in the two countries.

IMELS will co-finance the activities approved under the MOU with a maximum amount of Euro 2 million.

A couple of project proposals have been submitted by the counterparts to IMELS for the assessment at the end of 2018.

### *Mauritius*

On February 2018, IMELS and the Ministry of Energy and Public Utilities of the Republic of Mauritius signed a Memorandum of Understanding for a cooperation in the field of renewable energy, energy efficiency and the fight against climate change.

The following priorities have been set by the Protocol:

- renewable energy technology, including but not limited to wind, solar, waste to energy, wave energy and biomass;
- sustainable waste management;
- the development of solar powered water pumping systems;
- the launch of renewable energy projects and energy efficiency through public-private partnerships;
- training activities, exchange of experts and information on renewable energy and energy efficiency.

IMELS will co-finance the activities approved under the Protocol with a maximum amount of Euro 2 million.

Three project concept notes have been presented by the counterparts to IMELS at the end of 2018.

### *Sao Tomé and Principe*

On December 2018, IMELS and the Ministry of Public Works, Infrastructure, Natural Resources and Environment of the Democratic Republic of Sao Tomé and Principe signed a Memorandum of Understanding for cooperation on climate change vulnerability, risk assessment, adaptation and mitigation.

The Parties will cooperate in particular in the following areas of common interest:

- collection, analysis and dissemination of meteorological data in order to observe and measure the impact of climate change on potentially vulnerable economic sectors;
- support for the implementation, reporting, monitoring and communication of Nationally Determined Contributions (NDCs);
- development of national policies and special programs for coastal zone management, disaster management, impact assessment and adaptation measures at local level;
- promotion and development of renewable energy;
- biodiversity preservation and reduction of environmental degradation;
- promotion of sustainable integrated water management;
- promotion of Climate Smart Agriculture (CSA) practices;
- sustainable waste management.

IMELS co-finances the activities approved under the Protocol with an amount of Euro 2 million.

### *Seychelles*

On February 2018, IMELS and the Ministry of the Environment, Energy and Climate Change of the Republic of Seychelles signed a Memorandum of Understanding for a cooperation in the field of sustainable energy and adaptation to climate change and mitigation.

The priorities set by the Protocol are the following:

- support for the definition of policies, regulations and strategies related to renewable energy;
- promotion and development of renewable energies, in particular those from solar, wind, hydroelectric and biomass sources;
- monitoring and support for the implementation of Nationally Determined Contributions – NDCs; promotion and development of renewable energies, in particular those from solar, wind, hydroelectric and biomass sources;
- promotion of energy efficiency;
- installation of off-grid systems in order to supply electricity to remote areas that do not have access to the electricity grid.

The Italian Ministry of the Environment will co-finance the activities approved under the Protocol with a maximum amount of Euro 2 million.

### *Zambia*

On November 2018, IMELS and the Ministry of National Development Planning of the Republic of Zambia signed a Memorandum of Understanding for cooperation on issues relating to reducing climate change vulnerability by enhancing risk assessment and implementation of various adaptation and mitigation measures.

The Parties will collaborate in the following areas of common interest:

- collection, analysis and dissemination of data relevant to the observation of climate change and measurement of its impact on the potentially vulnerable economic sectors;
- support to the implementation, monitoring, reporting and communication of Nationally Determined Contributions (NDCs);
- promotion of sustainable forest management, including reduction of deforestation and forest degradation (REDD +), and enhancement of afforestation and reforestation policies;
- promotion of Climate Smart Agriculture (CSA) practices;
- promotion of renewable energy and energy efficiency, also through the development of off-grid technologies in rural areas;
- sustainable integrated water management;
- sustainable waste management;
- integrated land use management to promote the sustainable use of resources.

IMELS co-finances the activities approved under the Protocol with an amount of Euro 2 million, which can be integrated with additional funds.

### *Union of the Comoros*

In 2015 IMELS and the Ministry of Production, Environment, Energy, Industry and Craftsmanship of the Union of the Comoros signed a Memorandum of Understanding for cooperation on vulnerability to climate change, risk assessment, adaptation and mitigation.

- Project: *Integrated Plan for the management of urban waste in the Union of Comoro* elaborated by the Counterpart and focused on sustainable organic waste management in the Isle by in particular in Moroni City.

The project aims to build an integrated urban solid waste management system and to develop a national model based on circular economy. In this paradigm, the waste will be treated as an economic resource, enhancing the recovery and recycling of materials and waste that currently ends up in landfills. The project also aims at creating new job opportunities in the sectors of green economy and material recovery.

### *Cooperation on climate change in Central and Latin America*

In the period 2017-2018, IMELS has signed 5 MoU's with the Republic of Cuba, the Republic of Peru, the Republic of Paraguay and the Republic of Argentina. The activities has a total budget of €7,000,000.

### *Cuba*

On July 2017, IMELS and the Ministry of Science, Technology and Environment (CITMA) signed a Memorandum of Understanding for cooperation on climate change vulnerability, risk assessment, adaptation and mitigation.

During the reference period, CITMA and IMELS supervised the implementation of the following approved initiatives:

- Project: *Central coastal front of the city of Havana: adaptation proposals before the Climate change challenges*, approved on 23 May 2018.
  Duration: 12 months

  Budget: € 1,699,715

  IMELS: € 1,699,715

The main goal is to elaborate a Feasibility Study to identify the best engineering solution for the protection of 7 km of the Malecón.

- Project: *Improve national capacities for the introduction and use of innovative and advanced technologies and tools that strengthen vulnerability, risk, adaptation and mitigation assessments of climate change in Cuban marine ecosystems. Temperature Increase, Rise Sea Level and Acidification of Oceans*, approved on 31 January 2018.
  Duration: 36 months

  Budget: € 1,055,545.

  IMELS: € 1,055,545.

The project aims to improve national capacities in the application of advanced technologies for mapping habitats through remote sensing, support the monitoring, surveillance and spatial planning in the marine and coastal systems and improve capacities to carry out evaluations of availability and feasibility on the use of marine energies.

- Project: *Maritime Surveillance in Cuba – SEnSE Solution*, approved on 23 May 2018.
  Duration: 36 months

  Budget: € 1,040,000.

  IMELS: € 1,040,000.

The objective of the project is to build up a system for environmental protection and safety, providing monitoring of sea waters. The main applications of the project are the detection of oil spill and vessels sailing.

On May 2018, IMELS and the Ministry of Energy and Mines (MINEM) signed a Memorandum of Understanding on Cooperation in the field of Sustainable Energy for Climate Change Adaptation and Mitigation.

The Parties will collaborate in the following areas of common interest:

- promotion, absorption and development of technologies that use renewable energy sources (biomass, solar photovoltaic, solar thermal power, wind power, solid urban waste and hydropower)
- promotion and deployment of renewable energy technologies for electrification and improvement of the quality of service in homes and isolated systems of the national electricity grid;
- support to the implementation, monitoring, reporting and communication of the Nationally Determined Contributions (NDCs) in the renewable energy sector;
- support to the development and implementation of policies, strategies and plans in the sustainable energy sector in order to achieve the emission reduction target adopted by the Republic of Cuba;
- enhancement of energy efficiency;
- stimulation and dissemination of the economic and technological transformation for low-carbon, sustainable development.

IMELS co-finances the activities approved under the Protocol with an amount of Euro 2 million, which can be integrated with additional funds.

### *Perù*

On July 2016, IMELS and the Ministry of Environment (MINAM) signed a Memorandum of Understanding for cooperation on climate change vulnerability, risk assessment, adaptation and mitigation.

During the reference period, MINAM and IMELS supervised the implementation of the following approved project:

- Project: *Supporting NDC's implementing in Peru*, approved on 12 December 2018.
  Duration: 24 months

  Budget: € 2,300,000

  IMELS: € 2,000,000

The project will contribute to build a long-term climate resilience through an integrated approach and will address specific sectors such as: agriculture, forestry and other land use (AFOLU) for the mitigation measures; water resources, agriculture, forests and health for the adaptation measures. The project aims to achieve 3 main outputs for the NDCs implementation at national and subnational level that are: 1) to acquire updated and available data; 2) to promote enhanced instruments for the coordination and 3) to focus on reducing deforestation.

### *Paraguay*

On November 2018, IMELS and the Secretary of the Environment signed a Memorandum of Understanding on cooperation in the field of Sustainable Energy for Climate Change Adaptation and Mitigation.

The Parties will collaborate in the following areas of common interest:

- collection, analysis and dissemination of data relevant to the observation of climate change and the measurement of its impacts on the potentially vulnerable economic sectors including strengthening of the early warning system and the risk assessment;
- support for implementation, monitoring, reporting and communication of the Nationally Determined Contributions (NDCs);
- sustainable management of forests including reduction of deforestation and forest degradation (REDD+), support to reforestation and afforestation programs providing the enhancement of forest carbon stocks;
- promotion of sustainable integrated water management;
- promotion and development of renewable energies (solar, wind and biomass);
- biodiversity preservation and reduction of environmental degradation;
- promotion of sustainable crop and livestock production practices for greater food security and greenhouse gas emissions reduction, also through the application of the climate-smart agriculture approach (CSA);
- exchange of human resources, technical cooperation and information with other global climate change initiatives;
- stimulation and dissemination of the economic and technological transformation for low-carbon, sustainable development.

IMELS co-finances the activities approved under the Protocol with an amount of Euro 2 million, which can be integrated with additional funds.

### *Argentina*

On May 2017, IMELS and the Ministry of the Environment and Sustainable Development (MayDS) signed a Memorandum of Understanding for cooperation on climate change vulnerability, risk assessment, adaptation and mitigation.

During the reference period, MayDS and IMELS supervised the implementation of the following approved initiatives:

- Project: *Strengthening Fire Early Warning and Statistics Systems in Argentina*, approved on 27 August 2018.
  Duration: 24 months

  Budget: € 1,181,588

  IMELS: € 880,175

The main goals of the project proposal are: to strength the early warning national system on forest fire; to establish an online National Registry of Fire Statistics; to aware the population of the importance of forest fire prevention.

### CARICOM

Since 2015, IMELS has been working with the Governments of Antigua and Barbuda, the Bahamas, Belize, Dominica, Grenada, Guyana, Haiti, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Suriname, according to a Memorandum of Understanding on Climate Change Vulnerability, Adaptation and Mitigation.

In particular, in 2017-18, 10 projects have been approved, mainly related to the energy sector. These projects are mostly significant as they contribute to achieve the NDCs of the countries. They are:

### *Antigua and Barbuda*

"Grid-Interactive Solar PV Systems for Schools and Clinics in Antigua". This project contributes to achieve Antigua and Barbuda's Nationally Determined Contribution (NDC), which consists of reaching 100% of electricity demand in essential services (including education, health facilities, food storage and emergency services) to be met through off-grid and grid-interactive renewable energy sources, by 2030. The project will ensure electricity even after storms and hurricanes. This project achieves its objectives through grant funding for grid-interactive solar PV renewable energy systems with battery backup for nine (9) buildings (clinics and schools) in Antigua and Barbuda. The grid-interactive feature of the solar installation is to ensure resilient energy systems for critical infrastructure, where the equipped schools and clinics can act as emergency shelters and their essential services continue even when the national electricity grid experiences interruptions to its services. The project contains also strong capacity building components.

### *Belize*

"Reducing the Carbon Footprint of San Ignacio and Five Surrounding Villages in the Cayo District Electric School Bus Pilot". The project is comprised of two components, which contribute to the reduction of the carbon footprint of Belize as well as reducing the vulnerability risk from climate change related extreme weather events. The first component consists of replacing inefficient street lights in the Town of San Ignacio and immediate adjacent villages with more efficient and longer lasting Light Emitting Diode (LED) light fixtures, 1000 low efficiency street lighting fixtures will be replaced with 1000 new LED fixtures. The second component consists of the design and the construction of a multi-purpose community self-contained center that can be used as a shelter in the event of a weather-related emergency. A photo voltaic (PV) renewable energy with battery backup will provide power to the centre. The aim of the CMEC is to provide five rural communities (Trenchtown, Kontiki, Boiton Area, Mosquitoville and Shawville) of a first shelter for weather-related emergencies.

### *St.Kitt and Navis*

"The Piloting of a Public School Bus Transportation System for St. Kitts Using Renewable Energy". The project promotes the use of efficient, environmentally clean, safe and cost-effective transportation, in the public transportation to and from schools. This project seeks to serve as the mechanism for the introduction of three electric powered school buses into the public school transport system.

### *Haiti*

"Implementation of a 110 kW Distributed Solar Electricity System for a Low Income Residential Development in Ouanaminthe". The project consists of the design and the installation of photo voltaic (PV) systems to provide renewable energy to residential apartment blocks. It would benefit from the use renewable energy for electricity generation by September 2017. Architectural plans and designs have already been completed.

### *Bahamas*

"Retrofitting of T.G. Glover Primary School": a retrofit of one of the main schools in New Providence island, through renewable energy solutions, waste management, ecosystems restoration and horticulture practices.

### *Belize*

"Pilot Initiative for the construction of a "Green" Ministerial Facility and supporting Transport System": regarding the greening of the Ministerial building and the provision of electric vehicles and related charging stations.

### *Dominica*

"Installation of a Renewable Energy Powered Back-Up Water Supply System for the City of Roseau" provides a backup water pumping system that will ensure the supply of water to the city;

### *Grenada*

"To Extend The Availability Of Reliable and Safe Potable Water to the Rural Areas Of Carriacou - Phase 2": after the completion of phase 1, the project is a second phase to combat against water scarcity;

### *Guyana*

"Transition To National Energy Security: Bartica As a Model Green Town - Phase2: after completion of phase 1, the project is a second phase dedicated to develop an energy efficiency strategy and to the dissemination of results and lessons learned;

### *St Kitts and Nevis*

"Building Climate Change Resilience by Enhancing Water Security in St. Kitts and Nevis". The project contributes to the efforts in ensuring water security at national level while increasing the system resilience to climate change impacts, through adaption of water management practices.

| **Country** | **Project** | **Cost** |
|---|---|---|
| Belize | *"Reducing the Carbon Footprint of San Ignacio and Five Surrounding Villages in the Cayo District"* | 900,000 |
| Antigua & Barbuda | *"Grid-Interactive Solar PV Systems for Schools and Clinics in Antigua"* | 825,000 |
| St. Kitts & Navis | *"The Piloting of a Public School Bus Transportation System for St. Kitts Using Renewable Energy"* | 564,000 |
| Haiti | *"Implementation of a 110 kW Distributed Solar Electricity System for a Low Income Residential Development in Ouanaminthe"* | 814,000 |
| Bahamas | *"Identification and implementation of Bahamas' nationally determined contributions – retrofitting of T.G. glover primary school"* | 956,498 |

| | | |
|---|---|---|
| Belize | *"A Government of Belize Pilot Initiative for the construction of a "Green" Ministerial Facility and supporting Transport System"* | 1,000,000 |
| Dominica | *"Installation of a Renewable Energy Powered Back-Up Water Supply System for the City of Roseau in Dominica"* | 610,000 |
| Grenada | *"To extend the availability of reliable and safe potable water to the rural areas of Carriacou- Phase 2"* | 600,000 |
| Guyana | *"Transitioning to national energy security: Bartica as a model green town, Phase II"* | 675,000 |
| St Kitts e Nevis | *"Building climate change resilience by enhancing water security"* | 770,000 |
| | | **Totale 6,077,137** |

### *REDD+ in Ghana, Panama, Papua New Guinea*

In 2015, a Memorandum of Understanding on cooperation to scale up private sector involvement in support of mitigation and adaptation to climate change, including addressing drivers of deforestation and forest degradation, and enhancement of low carbon sustainable development has been signed with Ministry of Environment, Science, Technology and Innovation of the Republic of Ghana, Ministry of Environment of Panama, and Ministry of Environment, Conservation and Climate Change of Papua New Guinea.

According to this programme, IMELS has supported activities to enable the three countries to present their National Forest Reference Level to the UNFCCC; as well as to evaluate the legal and policy frameworks, including national legislation around carbon ownership and rights, necessary to scale up private sector involvement in REDD+ activities.

## *Cooperation with Central and Eastern European countries on climate change*

### *Kazakhstan*

On the bilateral level, IMELS has signed in 2017 a Memorandum of Understanding on cooperation in the field of climate change vulnerability, risk assessment, adaptation and mitigation with the Ministry of Energy of the Republic of Kazakhstan, and is in the course of negotiating similar agreements with other Central Asian Countries and Mongolia.

### *Georgia*

In Georgia, IMELS and the Georgian Ministry of Environmental Protection and Agriculture signed a Memorandum of Understanding on 15 November 2017, for the promotion of policies to combat and adapt to climate change. IMELS support will be of €2,000,000.

In the framework of the cooperation activities, two projects feasibility studies were developed. One focused on air pollution; the second one dedicated to the integrated management system of the Mktari river basin.

### *Iran*

IMELS started its bilateral cooperation with the Islamic Republic of Iran in November 2015, signing with the Iranian Department of the Environment (DoE) the Memorandum of Understanding on "Cooperation for Environmental Protection and Sustainable Development".

Two joint projects are currently under preparation: a "Smart Grid Project" to be developed in the university area of Karaj, close to Tehran, consisting in adoption of powerline communication technology to turn street lights into infrastructure for smart grids, monitoring greenhouse gas emission, reducing pollution and improving road traffic; an "Adaptation project" to be developed in several natural protected areas of the Iranian territory.

### *Kurdistan (Iraq)*

On July 2017, IMELS and the Ministry of Transport and Communications of the Kurdistan Regional Government (Iraq), signed a MoU for the cooperation in the field of environmental protection and sustainable development.

As part of efforts to reduce greenhouse gas emissions, the MOU identifies areas of cooperation relating in particular to mitigation and adaptation to climate change:

- Collection, analysis and monitoring of data on climate change and the effects it generates on agriculture, food security and health;
- Early warning system and risk management related to extreme weather events;

During the reference period, the Ministry of Transport and Communications of the Kurdistan Regional Government (Iraq) and IMELS approved the Work Plan on 6 May 2019 and new iniatives are under discussion.

### *Scientific cooperation*

IMELS is also strongly committed to support programme on scientific research and technology transfer in strategic areas, like China, in collaboration with noteworthy research centre. These projects are dedicated to improve these regions capacity to tackle climate change by fostering research.
In the framework of the Sino-Italian Cooperation Program for Environmental Protection (SICP) several scientific and technological research projects have been implemented, in collaboration with the National Development and Reform Commission, the Chinese Ministry of Science and Technology, the main Chinese scientific institutions, Chinese Municipalities, companies and prestigious universities, such as Tsinghua University in Beijing, Tongji University in Shanghai and Jiaotong University in Shanghai.
Within the framework of Agreement on Scientific and Technological Cooperation between the Government of the Italian Republic and the Government of the People's Republic of China, IMELS co-funded in 2016 the project "Remediation of Old Landfills for Environmental sustainability and final Sink (ROLES)", which is on-going at Tsinghua University and University of Padova.
The project is to advance scientific research and technology related to old landfill remediation by using modern concepts such as environmental sustainability by keeping diffused, long-term, and greenhouse gas emissions under control, stabilization and immobilization of long impacting hazardous substances, final sink for elements, recovery of resources.

In the framework of the scientific and technological co-operation with **South-Africa** (in partnership with the Italian Ministry of Foreign Affairs) for the years 2018-2020, IMELS has approved two projects in the thematic area 'Blue Economy" and "Water Management":

- Genomics for a Blue Economy (Stazione Zoologica Anton Dohrn – Napoli);
- Integration of High Power Energy Storage Systems for Sustainable Water and Renewable Sources Management (University of Bologna).

The budget allocated for years 2018-2020 has been €300,000.

In the framework of the scientific and technological co-operation with **India** (in partnership with the Italian Ministry of Foreign Affairs), in 2017 and 2018, IMELS has approved four projects.
In particular, three projects in the thematic area 'Energy and environment, with particular focus on clean technologies for energy, resources utilization efficiency and soil remediation', i.e.

- Development of catalysts to obtain bio-fuels through Fischer-Tropsch synthesis from synthesis gas derived from biomass.
- Sustainable development of membrane electro bioreactors (eMBRs) for the reuse of waste water and the production of green energy from alternative sources (Bio WaR AGE)
- Advanced environmental monitoring system, based on photonics, for more effective prevention of landslides and structural failure risks
- one project in the thematic area of 'Industrial Research in the field of water technology', i.e. 'Study and development of innovative system to monitor and reduce concentrations of oils and heavy metals in industrial waste water'.

The budget allocated for years 2017 and 2018 has been €200,000

## 6.3 Technology development and transfer support

Enhancing climate technology development and transfer to developing countries for adaptation and mitigation actions and increase energy efficiency is crucial for addressing the global challenges of energy security, climate change and economic development with the aim to improve resilience to climate change and to reduce GHG emissions.
In recent years, as indicated in the above specific paragraph on bilateral cooperation, Italy has significantly intensified the number of Memorandum of Understanding with developing countries to implement projects related to mitigation and adaptation measures, which foresee the transfer of technologies according to the needs and specific circumstances of the receiving countries. All the projects implemented, under implementation or planned, consider knowledge transfer and adequate and specific training courses for the installation and maintenance of the equipment (soft technologies) in addition to the essential transfer of technologies (hard technologies).
During the implementation phase of each relevant project, endogenous people are constantly involved in the installation and operation start-up of the plants. Following this phase, tailored training programmes are organized to ensure proper control, function and routine maintenance.
With regard to reporting and monitoring activities, the Guiding Principles for the bilateral cooperation Mechanism foresee that each project shall be monitored, through the production of periodic reports, financial and technical evaluations approved by the Joint Committee, including, as appropriate, field missions and on site visits The JC supervises the projects, assessing the technology transfer, the realization of training courses and the implementation of all activities to facilitate the development of the policies, regulations, and overall institutional framework in the developing countries that is required to enhance technology transfer. The Parties annually prepare a report on the activities under the MoU and a third independent party carries out a final audit within six months of termination or expiration of the MoU. With regards to the private sector involvement, as a general approach, when drafting the bilateral cooperation agreements, IMELS investigates the potential contribution of the private sector, mainly technologies core and expertise, and tailors their rules in the technical and practical implementation of the projects. In particular, IMELS uses two different ways of involving the private sector. The first consists in publishing on the Ministry's website calls for interest for a specific sector and for a country or a region before organizing the technical missions and defining the needs with the beneficiary country. The second concerns the identification of companies holding specific technologies to implement projects already established with the receiving countries. Finally, IMELS organizes seminars, workshops and events related to bilateral cooperation and technology transfer, involving companies from the pertinent sectors and organizing business-to-business meetings.

In 2017 and 2018, there are no information on success and failure stories related to technology transfer activities to be reported.

## 7. Capacity-building support to developing country Parties[49]

During the biennium 2018-2019 the Italian Government has reaffirmed its commitment to strengthen the Italian development cooperation and to set up a path for a gradual realignment of annual appropriations allocated to it, such as to put Italy in line with the commitments taken at international level.

For the three year 2017-2019 the indication of the expenditure targets is included in the Economic and Financial Document (DEF) 2017[50]. The intermediate targets of expenditure indicated in the Economic and Financial Document 2017, for the three-year 2018-2020 are respectively 0.27% of Gross National Income in 2018, 0.28% in 2019 and 0.30% in 2020. In 2017 the Italian Public Development Aid (APS) has reached the share of 0.30% of Gross National Income (GNI).

Such a result is proving the significant achievement three years in advance, of the objectives to be reached by 2020. From this point of view the result achieved in 2017 is to be considered positive, however with respect to the objective of 0.7 % share of GNI as set by Agenda 2030 for the sustainable development, it is still persisting a considerable gap.

At this purpose, it was reiterated the need to continue to assure adequate increases of resources intended for development cooperation activities in order to assure from our Country the achievement of the objectives set both at international level and within the Law 125/2014. The specific approach by the Ministry of Foreign Affairs and International Cooperation (MFA) is therefore characterized by the integration of climate change in 2030 Development Agenda.

At a global level 2015 and 2016 have marked for the Development a crucial step characterized by the Launch of the new UN Agenda 2030 and of its 17 Sustainable Development Goals. At Italian level at this consideration, a new cooperation framework is adding starting from the new Law 125/2014 in which cooperation becomes a qualifying element for the whole foreign policy of the Country and in which, to the role of the most traditional actors like civil society organisations and of the territorial cooperation, other experiences and expertise coming from university and research and the private sector are called for an increasingly proactive contribution. In such a perspective it is essential to reconsider the link between the society challenges represented by the SDGs including the needs that emerge from them, and the combination university –research.

Through the promotion of appropriate development models, able to create autonomous development and to favor the elaboration of local knowledge, the scientific research can become a strategic tool for the sustainable growth. The enhancing of scientific knowledge and human and institutional capacity building in management and planning are essential objectives for promoting innovation, development and technology transfer. It assures involvement and ownership in the Country Partner and at the same time it enhances relations between the scientific, technical and academic communities and our Country.

The development cooperation as a true "*strategic investment*", which promotes the programming of resources over a three-year period, is part of the "*political vision*" of the new infrastructure for the Italian Cooperation reinforced by the starting of activities, in 2016, of the Italian Agency for Development Cooperation (AICS) and of Cassa Depositi e Prestiti (CDP) in its new role of Financial Institution for Development Cooperation. The new governance structure of the Italian Cooperation Law 125/2014 provides for new methods and actors to increase development cooperation activities towards selected countries on the basis of interventions divided into three macro areas: poverty reduction, economic development, and **management of climate change**.

**Law 125/2014[51]** has re-launched the **Italian development cooperation** marking a fundamental turning point from the drastic reduction in resources for development cooperation over the years of the

[49] Authors: Sandra Moscone (ISPRA), Antonella Ceccarelli (ISPRA)
[50] Documento di Economia e Finanza 2017 (http://www.rgs.mef.gov.it/_Documenti/VERSIONE-I/Attivit--i/Contabilit_e_finanza_pubblica/DEF/2017/Sez-II-AnalisiETtendenzeDellaFinanzaPubblica.pdf)
[51] Legge 11 agosto 2014, n. 125 Disciplina generale sulla cooperazione internazionale per lo sviluppo http://www.gazzettaufficiale.it/eli/id/2014/08/28/14G00130/sg

financial crisis. Under the new system, the Ministry of Foreign Affairs and International Cooperation provides guidance in the definition of cooperation policies, while the Italian Development Cooperation Agency, established following the reform, is in charge of implementing policies. This Law provided for a gradual increase in resources for development cooperation over a three-year period as stated in the Three-Year Programming Document 2016-2018 of the **Italian Ministry of Foreign Affairs and International Cooperation – MAECI**)[52]. The subsequent Three-Year Programming Document 2017-2019[53] confirms the above-mentioned strategic guidelines, provides an update about developments in Europe and in the Country and deepens some priorities on which Public Development Cooperation will focus on during the Three Year Period. Climate Change is still among the key intervention sectors of the development cooperation for the years 2018-2019.

According to the last **OCSE-DAC (Development Assistance Committee) Peer Review on Italian cooperation** (March 2019), the first[54] after the approval of Law 125/2014, Italy's performance on trans-border issues like climate change, environment, security, finance and trade is good overall. Italy actively supports global sustainable development, in particular where it links international engagement with domestic expertise. Italy shows good practice in enabling multi-stakeholder efforts as multi-stakeholder partnerships are at the heart of Italian development co-operation. Stakeholders were fully involved in co-ordinating and drafting new guidance on energy and development. Italy maintains a solid field presence and has grounded experience in fragile and crises countries. Of Italy it has been appreciated the spirit of the new Law 125/2014. Since 2014, the reform law has put international development co-operation at the centre of Italian foreign policy, improving transparency and accountability, the commitment on multilateral, the propensity for and emphasis on stakeholder's participation and the capacity to acquire a leadership in some areas (es. Cultural heritage and agriculture). Italy's Official Development assistance (ODA) has registered a strong increase from 2012 to 2017. However, this positive trend is likely not continuing because ODA is diminished in 2018 and the projections show a downward trend also for 2019. Overall, the outcome is encouraging.

Since 2015, the Italian Government continues allocating additional financial resources to the international development cooperation. On top of these resources, the commitment of Italy to tackle climate change and related support to developing countries is strongly expressed in Decree no.30 (DLGS n.30 13/03/2013[55]). In the provision of public financial resources, Italy aims to strike a fair balance between mitigation and adaptation over time.

Starting from the Paris Agreement, the **Italian Ministry for the Environment, Land and Sea (IMELS)** has signed more than 50 Cooperation Agreements on **Climate Change**, aimed at carrying out actions for mitigation and adaptation in emerging and developing countries where $CO_2$ emissions have reached high levels and require targeted interventions.

For the Three-Year 2017-2019 the 22 priority Countries of Italian cooperation are confirmed, as identified in the previous Three Year Programming & Policy Planning Document (PPPD) 2016-2018 including:

- SUB-SAHARIAN AFRICA: Burkina Faso, Senegal, Niger, Etiopia, Kenya, Somalia, Sudan, South Sudan, Mozambico;
- MEDITERRAN: Egypt, Tunisia;
- MIDDLE EAST : Lebanon, Palestine, Jordan;
- LATIN AMERICA AND CARIBBEANS: Bolivia, Cuba, El Salvador;
- ASIA: Afghanistan, Myanmar, Pakistan.

[52] Cooperazione Internazionale per lo Sviluppo - Documento Triennale di Programmazione e di Indirizzo 2016-2018 (MAECI) http://www.esteri.it/mae/resource/doc/2017/03/doc_triennale_2016-2018_-_finale_approvato.pdf
[53] Three Year Programming & Policy Planning Document (PPPD) 2017-2019 (MAECI) https://www.esteri.it/mae/resource/doc/2018/07/pro_triennale_2017-2019_en.pdf
[54] Italy has been a member of the DAC since 1961 and was last reviewed in 2014
[55] Decreto legislativo 13 Marzo 2013 n.30 (https://www.minambiente.it/sites/default/files/archivio/normativa/dlgs_13_03_2013_30.pdf)

Italy's bilateral programming consists mainly of project-type interventions. The main objective is to strengthen the bilateral cooperation through effective partnerships in the spirit of Law 125/2014. During the period 2018-2019, the bilateral cooperation activities promoted by IMELS have continued increasing through the signature of 17 new bilateral agreements with the launch of numerous projects.

The common objectives of the above mentioned cooperation agreements are: to strengthen and coordinate efforts to combat global climate change, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy ensuring energy security, to stimulate and disseminate the transition towards a sustainable low-carbon economy through technology development and transfer, to implement adaptation actions and opportunities to protect the environment and natural resources.

Among the instruments of intervention, a major role is played by technology transfer, with the involvement of the private actors, in several sectors such as energy, transport, industrial or urban management. It could be useful, as complementary measure, to start an energy conversion plan from fossil fuels to renewable and sustainable ones, as well as promoting the definition of sustainable finance in those markets that already have a good degree of development in the financial sector.

As contribution to the development of renewable energies and the best financial mechanisms available for action to combat climate change and reduce greenhouse gas emissions, IMELS participates in the "UNEP Inquiry into the Design of a Sustainable Financial System" in order to identify concrete ways to mobilize private climate capital.

With regard to environmental intervention lines, including sustainable energy development, **IMELS** operates jointly with **MAECI** focusing its environmental support action towards those Countries most exposed to the effects of global warming: the small developing islands and developing countries, especially in those low-income countries with less resilience capacity and less ability to fight climate change effects. The main intervention sectors are:

- management of extreme events;
- promotion of renewable energy and energy efficiency;
- management of water resources;
- waste management;
- promotion of air quality;
- contrast to forest degradation;
- requalification of soil and land;
- sustainable mobility.

During the biennium 2018-2019 IMELS cooperation has continued its efforts for the achievement of the Paris Agreement and the 2030 Sustainable Development Agenda aiming at the integration of the economic, social, environmental and institutional pillars. Italy has contributed to the definition of a new European consensus on Development bringing to that context its vision on the themes deemed to be of priority importance. Italy has maintained the reference to the African, Pacific and Caribbean Countries in a shared framework of principles and values in the implementation path of Agenda 2030.

A priority interest was given to the African Continent being at the top of European and international political Agenda. Italy continued to support EU action aimed at giving relevance and importance to Africa by investing in an equal and multidimensional partnership. On the occasion of the G7 Environment in Bologna (June 2017) Italy announced the launch of the **Africa centre for Climate and Sustainable**

**development (ACSD)** in order to facilitate voluntary exchange of information and activities in support of the African Countries. The main objective is also to promote the transition of the African Countries to a new energy model. Since 2018 ACSD is supporting IMELS in the implementation of cooperation activities in the field of climate vulnerability, desertification and biodiversity conservation. Through the ACSD Italy intends to strengthen the cooperation activities in the Sahel region where climate change effects represent the root causes of the extreme poverty.

The **international cooperation activity carried out by IMELS** is very diversified both bilaterally and multilaterally. All projects and programmes financed in this context have been proposed by developing countries and reflect priorities and objectives.

In **Asia**, in the framework of the long-standing cooperation between IMELS and the numerous Chinese institutions, has taken shape a new knowledge approach on the base of the previous experience and in the light of the new political and economic role of China within the international community. The signing of a **Joint Declaration on the re-launch of the Sustainable Development and Environmental Partnership** with the Chinese Ministry of Environmental Protection is the result of a strengthened cooperation on a new basis, with the contribution of private investments and a greater involvement of companies, in particular in the development and exchange of experiences and best practices in the field of innovative and low-carbon technologies.

The investments in low-carbon, sustainable and high quality infrastructure are a focus of the Belt and Road Initiative (BRI) development strategy[56]. In order to ensure global climate goals are met, this Initiative needs to bring cost-effective new low-carbon methods to developing countries and avoid outdated polluting technologies. China is proposing a holistic implementation of the BRI, covering a number of broad aspects that will be important for achieving the 2030 sustainable development goals. The development of a global energy interconnection and the achievement of green and low-carbon development is one of the aspects of this much broader approach.

Italian cooperation activities are continuing in the framework of the Sino-Italian Cooperation Program for Environmental Protection (SICP) signed in the year 2000 between the Italian Ministry for the Environment, Land and Sea (IMELS) and the Chinese Ministry for Environmental Protection (MEP). In over 19 years the cooperation agreement implemented hundreds of projects in support of China's Sustainable Development, thus becoming a model for bilateral cooperation. Joint initiatives are implemented in the field of mitigation and adaptation to climate change, transfer and promotion of low-carbon technologies, studies and researches as scientific support to decision-making.

Since 2003, IMELS promotes an Advanced Training Program on Environmental Management and Sustainable Development aimed at technicians, academics, young professionals and decision-makers from Chinese administrations, universities and companies: the **Sino Italian Capacity Building for Environmental Protection - SICAB**. This high-level training program is supported by the Italian Ministry for the Environment, Land and Sea within the SINO-ITALIAN cooperation program for environmental protection (SICP).

Within SICAB in 2018 and 2019 several training courses have been provided by a professional consortium led by the **Politecnico di Milano** both in Italy and in China. Over 500 participants from all the provinces of China took part in the training programme. The consortium includes Euro-Mediterranean Center on Climate Change, Italy China Foundation, Fondazione Politecnico di Milano and Sapienza University of Rome. The training modules aimed at strengthening the planning capacity of the representatives of the central and local Chinese institutions in the field of environmental issues that have been deemed as a priority in the Chinese agenda including climate change.

Under the agreement on **Beijing Clean Air Action Cooperation between IMELS and the People's Government of Beijing Municipality**, signed in 2013, capacity building projects were developed :"Ozone and its Precursors Monitoring Capability Building Project", "Technical Research and demonstration on low-

[56] https://www.oecd.org/finance/Chinas-Belt-and-Road-Initiative-in-the-global-trade-investment-and-finance-landscape.pdf

Nox Control of Wall-mounted Gas Furnace" and "Particular Matters Monitoring Project". The main objective of these projects is to continue to strengthen the capabilities of Beijing EPB in the management and control of air pollution sources by sharing experience about emissions assessment and authorization procedures, pilot research activity on emission sources, calculation of emissions and pilot case assessment, and regulatory and authorization procedures for polluting industries on the basis of European experience.

After the reforms of 2018, which marked the beginning of a new chapter for China in its battle for blue skies with the launch of China's second air pollution action plan in 2018, the National Development and Reform Commission's climate change and carbon emission responsibilities shifted to the Ministry of Ecology and Environment. The Three-year Action Plan indicates that China's management of air pollution and climate change are coming together. The plan calls explicitly for "large reductions in total emissions of major pollutants in coordination with reduction in emissions of greenhouse gases." The Three-year Action Plan (2018-2020 - The Three-Year Action Plan for Winning the Blue Sky War Plan[57]') continues to strengthen end-of-pipe treatment, but also takes more detailed measures on the sources of pollution and structural issues, including transitions in energy, industrial and transportation.

In 2018 a **Memorandum of Understanding between IMELS and the University of Tongji on the Sino-Italian Center for Sustainability (SICES)** was signed. The Center aims at enhancing the collaboration between Italian Research centers and Chinese Research center on Greener Cities, to promote research and capacity building in the following sectors: Climate Change Adaptation/Mitigation, Energy Efficiency/Renewable Energy, Resource Efficiency/Circular Economy. This cooperation aims at promoting SICES as a center of excellence for the research and innovation on the development of green technologies and solutions for Green Cities and in advancing in Sustainable Development. The main objectives are to improve the urban environment quality to tackle climate change, wellbeing and health in cities and to actively participate in global environmental governance through China-Italy cooperation in the framework of several national and international development scenarios and strategies including the Paris Agreement.

In **Middle East Asia**, IMELS opened new channels of cooperation in the field of Climate Change Vulnerability, Risk Assessment, Adaptation and Mitigation with the **United Arab Emirates** in which the transfer of technologies and capacity building aim to ensure the involvement of the private sector and with **Uzbekistan** to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emissions and Green Economy. IMELS is providing technical assistance and boosting opportunities for entry into the Middle Eastern market of Italian companies operating in the "green economy" sectors. Agreements are also being negotiated with Azerbaijan, Iraq and Turkmenistan.

In **South-East Asia**, IMELS started a new cooperation with **Vietnam** to strengthen and coordinate the efforts, to combat global climate change and address its adverse effects through the development of the National Spatial Data Infrastructure. The first Joint Committee Meeting was held in Katowice in December 2018 and the following thematic priority areas of cooperation have been identified: climate change adaptation and mitigation, remote sensing application and water resources management. A new technical Agreement with **Jordan** was also signed in 2018 and within this cooperation capacity building activities are focused on renewable energy and energy efficiency measures. Agreements are also being negotiated with Myanmar, Philippines, Indonesia and Malaysia.

In **Africa**, IMELS has a ten-year cooperation program with Egypt, Tunisia and Morocco focused on the promotion of renewable energies, the dissemination of financial mechanisms for the use of solar heating and the support to multi-level governance for a more efficient use of water resources. In 2018, IMELS signed new cooperation agreements with **Kenya, Tunisia and Zambia** to promote secure, clean and efficient energy in order to strengthen and coordinate the efforts to combat global climate change, address its adverse effects and reduce vulnerability, to protect the environment and natural resources, and to stimulate the transition towards a sustainable low-carbon economy. Cooperation activities will

[57] Blue Sky Battle Plan (http://www.gov.cn/zhengce/content/2018-07/03/content_5303158.htm)

continue to prioritize the management and treatment of water and the promotion of energy efficiency and renewable energy. Agreements are also being negotiated with Burkina Faso, Costa D'Avorio, Gambia, Ghana, Liberia, Mauritania, Mozambico, Senegal and Tanzania.

In **Central and Latin America**, besides the bilateral agreements already launched by IMELS with Argentina, Costa Rica, Cuba, Mexico and Peru in 2016-2017 and still ongoing, 3 new Memoranda of Understanding have been signed by IMELS with **Cuba, Dominican Republic and Paraguay** in 2018-2019. Activities are focused on: renewable energy and energy efficiency, management of environmental risks resulting from global climate change (Cuba); sustainable management of forests, biodiversity preservation, energy efficiency and sustainable integrated water management (Paraguay). A cooperation Agreement is also being negotiated with Ecuador.

**Developing Small Islands** are a group of Countries particularly vulnerable to climate change, posing a challenge to development, with strong implications for poverty, conflict and social cohesion. In this area enhanced action and international cooperation on adaptation is needed to enable and support the implementation of adaptation activities aimed at reducing vulnerability and building resilience. IMELS has always supported **the Pacific Small Islands (Cook Islands, Fiji, Kiribati, Micronesia, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Tonga, Tuvalu, and Vanuatu**), through specific projects on climate change adaptation, protection against climate vulnerability and variability, mitigation of harmful emissions, promotion of renewable energy, especially in rural areas, and for the protection of oceans and their ecosystems. To date, 14 beneficiaries are participating in the cooperation program. The priorities expressed by the PSIDS governments are largely focused and aimed at the creation of resilient societies, in the effort to face and prevent the risks deriving from climate change. The Cooperation Program envisaged two macro areas of intervention, **Sustainable Energy** and **Climate Change Adaptation**, which respond to the needs of mitigation, adaptation and contrast of the effects of climate change through the protection of terrestrial and marine ecosystems, with particular attention over the years to small vulnerable communities in rural areas and remote islands. Between 2018 and 2019, the funding for climate and ocean training projects has increased, in line with Article 11 of the Paris Agreement.

**Caribbean Community** - IMELS has also an ongoing wide cooperation program with 11 of the 15 CARICOM countries (**Antigua and Bermuda, Bahamas, Belize, Dominica, Grenada, Guyana, Haiti, St. Kitts and Nevis, St. Vincent and the Grenadines, St. Lucia, Suriname**) for the implementation of projects on weather alert systems, energy efficiency and the promotion and use of renewable energy, sustainable water management and sustainable transport. Six million euros for the 2016-2017 period and 6 million euros for the period 2018-2019 have been committed to this cooperation. The implementation of the cooperation with CARICOM is entrusted to **the Caribbean Center on Climate Change (5C) in Belize** with a specific Memorandum of Understanding. IMELS cooperates also with the Small Islands of the Indian Ocean – Maldives, Mauritius, Seychelles and the Union of the Comoros, with the implementation of projects on data management for better governance of meteorological risk, renewable energy and energy efficiency, integrated water management and treatment, including desalination.

**Multilateral Cooperation on climate change -** Between 2018 and 2019, the Italian multilateral environmental activities were carried out in several organizations or programmes, such as: the World Bank (WB), the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Adaptation Fund (AF), the Food and Agriculture Organisation (FAO), the Initiative Climate Action Transparency (ICAT), REDD+ implementation, the African Development Bank (ADB) and the Inter-American Development Bank.

**Multilateral International cooperation** of Italian Ministry for the Environment, Land and Sea has been strengthened through participation in funds and programs promoting renewable energy and energy efficiency and resilience to climate change such as through the International Finance Corporation of World Bank (Clean Energy Access Program Trust Fund and MENA - Middle East and North Africa - Inclusive Green Growth Initiative) and the African Development Bank (Africa Climate Change Fund and Sustainable Energy Fund for Africa). For the implementation of the UNFCCC commitments, IMELS contributes to the Green Climate Fund, the Adaptation Fund and, through the Global Environment Facility (GEF), supports the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). Through the World Bank, it supports the Communication for Climate Change Multidonor Trust Fund (CCC) and

UNEP, the program Inquiry into the design of a sustainable financial system. For the implementation of the Montreal Protocol, IMELS participates in the Multilateral Ozone Fund, the financial mechanism for the protection of the ozone layer and supports the Climate and Clean Air Coalition Initiative (CCAC), which promotes the exchange of information and best practices to implement measures to reduce emissions of methane, hydrofluorocarbons and black carbon. In order to support African countries to prepare and seek financing for programs and projects contributing to the implementation of the National Determined Contributions (NDCs) communicated to the UNFCCC, IMELS financed in 2017 the program "Promoting Africa's Green and Climate Resilient Development (AGREED).

Among the voluntarily and multi-stakeholder partnership, since November 2015, Italy is party and donor of the **Initiative for Climate Action Transparency (ICAT)**. This Initiative is working with developing countries to strengthen capacity to assess climate actions (in the context of their NDC's) and report their progress in line with the Paris Agreement, based on individual country needs. The Initiative supports in-country capacity development programmes through training modules on measurement, reporting and verification (MRV) of policies and actions, and knowledge sharing of good practice and lessons learned. ICAT was created as an unincorporated multi-stakeholder partnership by the Children's Investment Fund Foundation (CIFF); ClimateWorks Foundation (CWF); the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU); and the Italian Ministry for the Environment, Land and Sea (IMELS). The implementing partners are currently the UNEP DTU Partnership (UDP), Verra, World Resources Institute (WRI), and the Italian Institute for Environmental Protection and Research (ISPRA). The Climate, Community & Biodiversity Alliance (CCBA) and Rainforest Alliance are supporting partners and will contribute to specific aspects of the Initiative. In 2018 a **Contract Agreement between ISPRA and UNEP-DTU** has been signed (duration 18 months) for capacity building activities on the themes of transparency and reporting of the commitments undersigned by the Parties as established in the Paris Agreement (art 13) in 11 beneficiary Countries (**Argentina, Belize, Botswana, China, Cuba, Ethiopia, Iran, Maldives, Sudan, Tunisia and Vietnam**). ISPRA will transfer acquired experience in counting activities of the greenhouse gas emissions carrying out training initiatives addressed to officers and to key stakeholders of beneficiary countries .

Table 9 of the CTF provides details of the above mentioned capacity building intervention activities implemented by Italy which are grouped by geographical areas.

### CTF Table 9 Provision of capacity-building support (Period 2018-2019)

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
|---|---|---|---|---|
| **ASIA/MIDDLE EAST** | | | | |
| **Memorandum of Understanding on Sustainable Development**<br><br>**between**<br><br>**the Ministry for the environment, land and sea of the Italian republic**<br><br>**and**<br><br>**the Ministry of climate change and environment of the United Arab Emirates**<br><br>**(signed in New York on 24 September 2018 - ongoing)** | **United Arab Emirates** | Adaptation and<br><br>Mitigation | The objective of this Memorandum of Understanding (MoU) is to reinforce bilateral cooperation between the Parties in the fields of climate change and sustainable development, on the basis of mutual benefit. Under this MoU the transfer of technologies and the capacity building activities aim to ensure the involvement of the private sector.<br><br>The identified areas of cooperation are:<br><br>- implementation of the measures for mitigation and adaptation to climate change, as identified in the "Nationally Determined Contribution" that the United Arab Emirates has submitted to the UNFCCC on 22 October 2015;<br>- stimulation and dissemination of policies and tools to encourage economic diversification and technological transformation towards a sustainable economy;<br>- identification and implementation of climate change adaptation measures and new sustainable development opportunities in the field of urban planning and land development, buildings and construction, transport, renewable energy, energy efficiency and resourceefficient and cleaner production;<br>- identification and implementation of policies and technical solutions for sustainable farming, fisheries, food processing, landscaping, biodiversity conservation and tourism in the hyperarid environment; | https://www.minambiente.it/pagina/emirati-arabi |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
|---|---|---|---|---|
| | | | - identification and implementation of policies and technical solutions to air quality, noise monitoring and controlling, chemicals management and waste management;<br>- transfer of technologies and capacity building, aiming to ensure the involvement of the private sector;<br>- foster technical cooperation and information exchange | |
| **Sino-Italian Cooperation Program for Environmental Protection (SICP)**<br><br>**(2011- ongoing) between Italian Ministry for the Environment, Land and Sea and People's**<br><br>**Republic of China** | **China** | Technology development<br><br>& transfer<br><br>Multiple areas | The Cooperation Program between China and Italy, especially dedicated to Climate Change, has been launched on March 2011 with the aims to start a joint program of activities addressing mitigation and adaptation to climate change, transfer and promotion of low-carbon technologies, studies and researches as scientific support to decision-making.<br><br>The cooperation program includes activities for training and capacity building Programs on Climate Change and Sustainable Development.<br><br>The training aims at providing Chinese participants with theoretical instruments and practical cases on Italian and European experiences in the field of environmental protection and climate change.<br><br>The Chinese Institutions involved are: Ministry of Science and Technology (MoST), Chinese Academy of Social Sciences (CASS), Ministry for Environmental Protection (MEP), Beijing Metropolitan Environmental Protection Bureau (BMEPB), Shanghai Environmental Protection Bureau (SEPB), Tianjin Science & Technology Commission (TSTC) e la National Development and Reform commission (NDRC), and from 2013 the Ministry for Industry and Information Technology (MIIT).<br><br>Specific courses have been organized in the field of climate | http://www.minambiente.it/pagina/cina |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
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| | | | change and sustainable development related issues:<br><br>- Capacity building on climate change<br>- Climate change: policy, conventions and statistical systems<br>- Environmental management and sustainable development<br>- Eco-cities<br>- Industrial Energy Efficiency<br>- Sustainable Development: Innovation of Science Technology and Management for Ecological Environment<br>- Air and water pollution prevention and control<br>- Eco –management Strategies and Policies<br>- High-Technology and Science Parks for Sustainable Development<br>- Innovation of Enterprises Green Technologies<br>The capacity building activities are on-going (at 2019). | |
| **Memorandum of Understanding on the Cooperation in the field of Environmental Protection and Sustainable Development<br><br>between<br><br>The Ministry for the Environment, Land and Sea of the<br><br>Italian Republic** | **China** | Technology development<br><br>& transfer<br><br>Multiple areas including climate change | This Memorandum of Understanding (MoU) aims to continue to strengthen the cooperation between the Parties in the field of environmental protection and sustainable development on the basis of equality and mutual benefit. The cooperation under this MoU will be conducted also through Capacity building activities, including training and exchange of expenses.<br><br>In 2018 have been trained 15 members of central and provincial MEE[58] and other organizations selected by MEE on "Environmental Protection and Sustainable Development in Emission Permits Management" and 12 members of central and provincial MEE and other organizations selected by MEE on "Climate Scenarios, Adaptation, and Mitigation Policies". | http://www.minambiente.it/pagina/cina |

58 The Ministry of Ecology and Environment (MEE) since 2018, formerly the Ministry of Environmental Protection of the People's Republic of China (MEP)

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **(IMELS) and The Ministry of Environmental Protection of the People's Republic of China (MEP) (2017-2022)** | | | | |
| **Memorandum of Understanding between The Ministry for the Environment, Land and Sea of the Italian Republic (IMELS) And the Beijing-Municipal Environmental Protection Bureau (signed in Beijing on 16 June 2017, duration five years - ongoing)** | **China** | Adaptation and Mitigation | Under this Memorandum of Understanding between IMELS and the Beijing-Municipal Environmental Protection Bureau, recently reformed into Beijing Municipal Ecology and Environment Bureau (BEE), three projects were developed between 2018 and 2019 on sustainable development, air monitoring, pollution prevention and control especially regarding the urban heating & cooling sector, petrochemical and other key industrial sectors, as well as soil and water monitoring and environmental radiation.<br><br>The projects are :<br><br>• "Technical Arrangement on Beijing Electromagnetic Radiation Monitoring Network Project"<br><br>• "Particular Matters Monitoring Project" to enhance Beijing Municipality's capacity for air quality monitoring and pollution monitoring and control in particular on fine particles (PM2.5)<br><br>• "Tongzhou Water Environment Evaluation and Strategy | https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/protocollo_intesa_municipalita_Pechino.pdf |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | (TWEES)" to optimize water environment management strategies of Tongzhou District based on the practices and experiences of EU and Italy<br><br>Within this MoU, in 2018, 20 high level staff or technicians responsible for environmental management on Environmental Pollution Control were trained | |
| **Memorandum of Understanding between**<br><br>**The Ministry for the Environment, Land and Sea of the**<br><br>**Italian Republic (IMELS)**<br><br>**And the University of Tongji on SICES (signed in Shanghai on 18 May 2018, duration three years – ongoing)** | **China** | Adaptation and<br><br>Mitigation | The objective of this MoU is the establishment of the Sino-Italian Center for Sustainability (SICES) supported by IMELS and the University of Tongji (Tongji). The Center aims at enhancing the collaboration between Italian Research centers and Chinese Research center on Greener Cities to promote research and capacity building in Climate Change Adaptation/Mitigation, Energy Efficiency/Renewable Energy, Resource Efficiency/Circular Economy sectors. | https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/protocollo_tongji.pdf |
| **SINO ITALIAN CAPACITY BUILDING FOR ENVIRONMENTAL PROTECTION** | **China** | Adaptation and<br><br>Mitigation | The Sino Italian Capacity Building for Environmental Protection SICAB - is a high-level training program supported by the Italian Ministry for the Environment, Land and Sea within the SINO-ITALIAN cooperation program for | https://www.sicab.net/en/programme/sicab/<br><br>https://www.sicab.net/en/corsi/ |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **(SICAB)**<br><br>**(2003- ongoing) between**<br><br>**Italian Ministry for the Environment, Land and Sea and the following Chinese institutions:**<br><br>**Ministry of Ecology and Environment – MEE, the Ministry of Science and Technology – MOST, the Ministry of Industry and Information Technology – MIIT and the Beijing Municipal Bureau of Ecology and Environment – BMBEE and the Shanghai Municipal Bureau of Ecology and Environment – SMBEE, Chinese Society of Technology Economics – CSTE** | | | environmental protection (SICP).<br>Since 2003, IMELS promotes an Advanced Training Program on Environmental Management and Sustainable Development aimed at technicians, academics, young professionals and decision-makers from Chinese administrations, universities and companies.<br><br>The Training Program is being implemented in cooperation with the Ministry of Science and Technology (MOST), Ministry of Ecology and Environment (MEE), Beijing EPB, Shanghai EPB, National Commission for Development and Reforms (NDRC) and Ministry of Industry and Information Technology (MIIT).<br>This High Level Program saw the participation of many relevant Chinese institutions in the field of environment. The program has trained more than 10,000 representatives both in the public and in private sector thanks to more than 25 courses. SICAB aims at promoting the exchange of scientific and technological expertise on the issues of environmental management and sustainable development. It foresees a range of courses and academic lectures, as well as field visits and study of best practices. High-level directors and officials, researchers of numerous Chinese institutions are the beneficiaries of this program.<br><br>For 2018 and 2019 several training courses have been provided by a professional consortium led by the Politecnico di Milano both in Italy and in China. The consortium includes Euro-Mediterranean Center on Climate Change, Italy China Foundation, Fondazione Politecnico di Milano and Sapienza University of Rome. Over 500 participants from all the provinces of China took part in the training program. The modules aimed at strengthening the | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | planning capacity of the representatives of the central and local Chinese institutions in the field of environmental issues that have been deemed as a priority in the Chinese agenda, specifically:<br>– climate change<br>– sustainable development<br>– environmental management<br>– pollution of air, water, soil and urban areas: prevention and management<br>– waste management and disposal<br>– green economy and resource efficiency<br><br>The following two modules were strictly related to climate change:<br><br>**9 December 2018 – 23 December 2018**<br>**"Climate Scenarios, Adaptation and Mitigation Policies".** It was carried out for the Ministry of Ecology and Environment (MEE) for a duration of 14 days with 21 participants. The module aims to provide an in-depth overview of the issue of climate change, its impacts on key sectors and how those impacts are tackled globally in the framework of mitigation and adaptation measures. The CMCC Italian and international experience on the impact forecasts, on the techniques and on the strategies for mitigation and adaptation were shared with the participants, by proposing themes of peculiar interest, transferable and applicable to the Chinese territorial context. Through a multidisciplinary approach, the main economic and productive sectors were analyzed from the climate change perspective, focusing on the national and international policies and strategies, the innovative technology systems and best practices.<br>https://www.sicab.net/en/portfolio_page/module- | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | 8-climate-scenarios-adaptation-and-mitigation-policies/<br><br>**5 May 2019 – 19 May 2019, Como and Milan "Environmental Management and Climate Change(Mitigation)".** It was carried out in Italy for the Beijing Municipal Bureau of Ecology and Environment for a duration of 14 days with 21 participants and in China for the Ministry of Environment and Ecology with the duration of 5 days with more than 50 participants. The course is addressed to the measures involving source control and modification interventions prospected for climate change mitigation strategies, illustrated and analyzed in terms of the principal issues related to their regulatory, technical and planning definition and implementation. Beyond illustrating relevant issues involved in the relationships of climate change pollutants within global and local air quality effects, lectures illustrated general approaches utilized in the definition and evaluation of the basic contents of national and international policies and strategies. The training course focused also on the most significant innovative technology systems and best practices and on the field of renewable and innovative energy production systems. EU and Italian regulations and control strategies were analyzed. It included frontal lessons, meetings with some local companies, lab and site visits.<br>https://www.sicab.net/wp-content/uploads/2019/06/Modulo_09_ENG.pdf | |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
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| **Technical Assistance on Capacity Building for the Management and Control of Air Pollution Sources Particular Matters Monitoring Project**<br><br>**Technical Research and demonstration on low-Nox Control of Wall-mounted Gas Furnace**<br><br>**Ozone and its Precursors Monitoring Capability Building Project" (2017-2018)** | **China** | Mitigation | The objective of this projects was to continue to strengthen the capabilities of Beijing EPB (Environmental Protection Bureau) in the management and control of air pollution sources by sharing experience in emissions assessment and authorization procedures, pilot research activity on emission sources, calculation of emissions and pilot case assessment and regulatory and authorization procedures for polluting industries on the basis of European experience. | http://www.minambiente.it/sites/default/files<br><br>/archivio/allegati/sviluppo_sostenibile/cooper<br>azione_italia_cina_protezione_ambiente_201<br><br>6_17.pdf |
| **Memorandum of Understanding on co-operation in the field of**<br><br>**climate change vulnerability, risk assessment, adaptation and mitigation** | **Viet Nam** | Mitigation<br><br>and<br>Adaptation | This MoU aims to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, and to coordinate the efforts of adaptation to the global climate change, promoting measures and techniques aimed to protect the environment and natural resources and to enhance the regional and local resilience in Viet Nam. | https://www.minambiente.it/pagina/vietnam |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **between IMELS and the Ministry of Natural Resources and Environment of the Socialist Republic of Viet Nam (Signed in Hanoi on 5 June 2018, duration five years - ongoing)** | | | The first Joint Committee Meeting was held in Katowice in December 2018 and the following thematic priority areas of cooperation have been identified: climate change adaptation and mitigation, remote sensing application, water resources management. The cooperation under this MoU includes the enhancement of capacities for the development of the National Spatial Data Infrastructure. | |
| **Memorandum of Understanding on cooperation in the field of energy between IMELS and the Ministry of New and Renewable Energy of the Republic of India ( signed in New Delhi on 30 October 2017 - ongoing)** | **India** | Adaptation and Mitigation | This MoU for the cooperation in the energy sector is focused on two main areas of cooperation: promotion of the production and utilization of renewable energy from solar power, wind energy, hydroelectric and biomass; elaboration of new technologies in the energy field, especially for the energy storage. Cooperation activities include capacity building through training and education. | https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/MOU_India.pdf |
| **Technical Agreement** | **Jordan** | Adaptation and | The objective of this TA is to reinforce bilateral cooperation between IMELS and JREEEF in the field of climate change and sustainable development, on the basis of equality, reciprocity and mutual | https://www.minambiente.it/pagina/giordania |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **on**<br><br>**sustainable development cooperation in the field of climate change adaptation and mitigation**<br><br>**between**<br><br>**the Ministry for the environment, land and sea of the Italian republic**<br><br>**(IMELS) and**<br><br>**the Jordan renewable energy and energy efficiency fund (JREEEF)**<br><br>**operating under the**<br><br>**Mministry of energy and mineral resources of the Hashemite Kingdom of Jordan (MEMR)**<br><br>**(signed in Rome on 21 march 2018, duration five years - ongoing)** | | Mitigation | benefit.<br>Within this cooperation the environmentally sound technology transfer and the capacity building activities are in the field of: renewable energy and energy efficiency measures; implementation of research and development on low-carbon technologies through the private sector engagement; implementation of the measures identified in the Intended Nationally Determined Contributions (NDCs) and in particular in the INDC that the Hashemite Kingdom of Jordan has submitted to the UNFCCC in November 2016 and which became a NDC in 2017 and the development of innovative financial measures and economic instruments for the renewable energies and energy efficiency measures. | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of understanding between IMELS and the Ministry of Environment and Natural Resources Protection of Georgia**<br><br>**(signed in Bonn on 15 November**<br><br>**2017, duration five years - ongoing)** | **Georgia** | Adaptation<br><br>and<br><br>Mitigation | This MoU aims to strengthen and coordinate the efforts, to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low carbon emissions and to implement adaptation actions and opportunities to protect the environment and natural resources in Georgia.<br><br>On 10 January 2019, a medium term Work Plan with the aim of identifying and select activities and projects that correspond to the above mentioned general objectives of the MoU entered into force. The intention is to make substantial contribution to the implementation of both adaptation and mitigation actions to proper address and manage the current and future impacts of climate change in Georgia. The WP focuses on the following areas of interest:<br>- forestry<br>- water management<br>- renewable energy and energy efficiency<br>- agriculture and air protection.<br>Independently of the activities to be implemented the bilateral cooperation will include capacity building activities with particular attention to technical assistance aimed to enable the environment for private investments, including the introduction of appropriate measures within the policies and regulatory framework of the Parties. Joint activities will focus also on environmental education and training programme as well as on technical assistance to strenghten access to funds from International Financial Institutions (IFIs). | http://www.minambiente.it/pagina/georgia |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | In the framework of this cooperation, two projects feasibility studies were developed focused on air pollution and on the integrated management system of the Mktari river basin. | |
| **MoU between IMELS and The Ministry of Energy of the Republic of Kazakhstan (Signed in Astana, on 4 September 2017, ongoing)** | **Kazakhstan** | Adaptation and Mitigation | The purpose of this Memorandum of Understanding (MoU), within the competencies of the Signatories, is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms to reduce climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate transition towards a sustainable low- carbon economy and to implement adaptation actions and opportunities to protect the environment and natural resources in the Republic of Kazakhstan.<br>On 25 January 2019 a medium term Work Plan has been approved with the aim of identifying and selecting activities and projects that correspond to the general objectives of the MoU | https://www.minambiente.it/pagina/kazakistan |
| **Technical Arrangement on co-operation in the field of environmental protection and sustainable development between the Ministry for** | **Iraq** | Adapation and Mitigation | Through this Technical Arrangement the Parties will encourage and develop cooperation in the field of environmental and climate protection and sustainable development on the basis of equality, mutual benefits and in accordance with their laws and regulations, taking into consideration their environmental and climate policies.<br>The Parties will cooperate through capacity building activities in the field of:<br>• Systematic observation of the climate system;<br>• Provision of climate services in support of sustainable development, health and safety of population;<br>• Early warning systems and emergency preparedness; | https://www.minambiente.it/pagina/kurdistan-iraq |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **the environment, land and sea of the Italian republic and the Ministry of transportation and communications of the kurdistan regional government of Iraq ( signed in Rome on 20 july 2017, duration five years - ongoing)** | | | • Climate change adaptation and mitigation;<br>• Impacts of climate change on agriculture and food security;<br>• Management of water resources;<br>• Development of data archives related to climate change and data rescue of historical climate data.<br><br>Ongoing project:"Supporting in Implementing the TA on Sustainable Development Cooperation in the field of Climate Change Adaptation and Mitigation". The project aims at facilitating the implementation of the Agreement and the participation of the Counterpart to international meetings. | |
| **Technical Agreement on Sustainable development Cooperation between IMELS And the Lebanese Centre for Energy Conservation (LCEC)**<br><br>**(Signed on 7 July 2016, duration three years)** | **Lebanon** | Mitigation | This agreement is aimed at the promotion of innovation in energy technologies, especially for the residential and tertiary sector, essential to cost- effectively address the global climate change challenges agreed at COP 21. It aims at reinforcing bilateral cooperation between the Parties in the field of climate change and sustainable development through Capacity building activities, technical assistance and technology transfer aimed at introducing new renewable energy technologies and awareness raising activities. The Transfer of scientific and technical knowledge and experience is also considered as well as the Exchange of experts, scientists and researchers.<br>In the implementation of the Projects and Activities consideration will be given to the participation of the public , private and no-profit sectors and where appropriate, Universities, scientific and technical research bodies and Non -governmental Organizations. | http://www.minambiente.it/pagina/libano |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | Activities are focused on the following priority sectors: Mitigation measures and policy support ; Mitigation measures and technology transfer ; Mitigation measures and Innovative financial market schemes.<br>On 28 July 2016 a medium term Work Plan has been approved focusing on three aspects : innovation of energy policies; promotion of sustainable and low carbon emission technologies ; innovative financial policies to support energy efficiency and renewable energies.<br><br>Capacity building activities:<br>"Heat Pump project Phase 1" (December 2016 - December 2020). This project provides support to the Lebanese government in addressing the climate change mitigation challenges presented in the INDC under the UNFCCC by introducing "heat pump" technologies in the heating, domestic hot water production and cooling sectors (for residential and tertiary applications mainly) through know-how and technology transfer in line with the European legislation and Montreal Protocol for the phasing out of the<br>high global warming potential refrigerant gases (fluorinated greenhouse gases- including hydrofluorocarbons -HFCs). This support will include capacity building and technology transfer activities. Public and Private actors have been involved in the development of the project.<br>Partners of the project: Lebanese Center for Energy Conservation (LCEC), IMELS, Lebanese Ministry of Energy and Water, Central Bank of Lebanon, Lebanese Standards Institution (LIBNOR). | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of Understanding between the Ministry for the environment, land and sea of the Italian republic and the Ministry of environment of the state of Qatar (signed on 28th January 2016, (duration five years - ongoing)** | **Qatar** | Technology development & transfer and technical assistance<br><br>Adaptation and Mitigation | The main objective of this cooperation is the Promotion of clean and efficient energy and to stimulate and disseminate the economic and technological transformation to low emission, ensuring energy sustainability and creating adaptation actions and opportunities to protect the environment and natural resources through the following actions:<br>• Capacity building for monitoring, reporting on climate issues, such as mitigation and adaptation;<br>• Stimulation and dissemination of the economic diversification and technological transformation towards low GHG development in ensuring energy sustainability and creating adaptation actions and opportunities<br>• Development of public awareness campaigns<br>• Exchange of experts, delegations visits and trainees on mitigation and adaptation to climate change;<br>This project aims also at the promotion of the Program REDD+ (Reducing Emissions from Deforestation and Forest Degradation) | http://www.minambiente.it/pagina/qatar |
| **Memorandum of Understanding on Cooperation in the Field of Climate Change Vulnerability, Risk Assessment, Adaptation and** | **Uzbekistan** | Adaptation and Mitigation | The main objectives of this Memorandum of Understanding, within the respective competences of the Parties are: to strengthen and coordinate the efforts, to combat global climate change and address its adverse effects; to support mechanisms for regional climate change vulnerability and risk assessment; to promote clean and efficient energy; to stimulate and disseminate the economic and technological transformation to low emissions and Green Economy; to | https://www.minambiente.it/pagina/uzbekistan |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **Mitigation between the Ministry for the environment, land and sea of the Italian republic and the State committee for ecology and environmental protection of the Republic of Uzbekistan (signed in Tashkent, on 24 January 2019)** | | | implement adaptation actions and opportunities and to protect the environment and natural resources in the Republic of Uzbekistan.<br><br>The Parties will cooperate in the analysis of the impact of climate change on the environment, in the implementation, monitoring and communication of the NDCs, the reduction of the biodiversity loss and the enhancement of capacities for the implementation of Mechanisms under the UNFCCC and related documents for the 2030 Agenda for Sustainable Development. Capacity building will be addressed to climate change adaptation at national and local levels. Joint cooperation will focus on the development of public education and awareness campaigns on environmental protection, to mitigation and adaptation to climate change, to air quality and land quality monitoring, on integrated management of ecosystems in water bodies and coastal areas, on sustainable management of protected areas, on integrated waste management and to support the preparation and implementation of disaster risk reduction action plans under the Sendai Framework for Disaster Risk Reduction 2015-2030.<br><br>The cooperation between the Parties will be conducted through joint projects, capacity building, technology transfer and technical assistance including the exchange of experts and trainees, the organization of delegation visits, workshops, seminars or other meetings.<br><br>The promotion of private sector participation and activities for the development of Public-Private Partnerships are also included as well as the enhancement of cooperation with the non-governmental organizations with regard to programs and initiatives in the field of | |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
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| | | | environment and sustainable development and development of fundraising capacities with regard to global climate and sustainable development. | |
| **AFRICA/MED REGION** | | | | |
| **MoU on co-operation in the field of**<br><br>**climate change**<br><br>**vulnerability, risk assessment, adaptation and mitigation between IMELS and the**<br><br>**Ministry of**<br><br>**Environment, wildlife and tourism of the Republic of Botswana**<br><br>**(signed in Paris on 11 December**<br><br>**2015, duration five years - ongoing)** | **Botswana** | Technology development<br><br>& transfer<br><br>Adaptation and Mitigation | The purpose of the Memorandum of Understanding is the strengthening of the efforts to combat climate change and address its adverse effect in the Republic of Botswana. Among the areas of co-operation:<br><br>• Enhancement of capacities for the implementation of Mechanisms under the UNFCCC and its related instruments;<br><br>• Simulation and dissemination of the economic and technological transformation towards low emission development in ensuring energy security and creating adaptation actions and opportunities<br><br>• Development of public education and awareness campaigns on mitigation and adaptation to global climate change.<br><br>The cooperation is carried out through the following means:<br><br>- implementation of joint projects<br>- capacity building<br>- technology transfer<br>- technical assistance | http://www.minambiente.it/pagina/botswana |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **MoU on Cooperation in the field of Climate Change vulnerability, risk assessment, adaptation and mitigation between IMELS and the Ministry of Environment, Nature Conservation and sustainable Development of the Democratic Republic of the Congo ( signed in Marrakech on 17 November 2016, duration five years - ongoing**) | **Congo** | Technology development & transfer<br><br>Adaptation and Mitigation | The Memorandum of Understanding is aimed at strengthening and coordinating the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emission Development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources.<br><br>Areas of cooperation: Forestry sector; Agricultural sector; Energy efficiency.<br><br>Cooperation activities will include, among others, realization of joint projects, capacity building, technology transfer and technical assistance.<br><br>Projects approved by the Joint Committee :<br>• "Bukavu Green Community as pioneers of an integral and sustainable development in Democratic Republic of Congo" (ongoing, June 2018-june 2021); outputs in progress: 30 engineers from Goma and Bukavu trained.<br>• "Sustainable Energy Services for Rural DRC" ( ongoing, April 2019-April 2022); Outputs in progress: 80 entrepreneurs trained for commercial and financial activities in the energy sector; 15 public officials in renewable energies and rural electrification trained .<br>• "Decentralized networks of off-grid systems based on Renewable Energy"<br>• "Sources and energy efficiency measures" ( not yet launched, date to be defined ) | http://www.minambiente.it/pagina/repubblic a-democratica-del-congo |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **MoU on Cooperation in the Field of Climate Chance Vulnerability, Risk Assessment, Adaptation and Mitigation between IMELS and the Ministry of Habitat, Planning and Environment of the Republic of Djibouti (signed in Marrakech on 17 November 2016, duration five years - ongoing)** | **Djibouti** | Technology development & transfer<br><br>Adaptation and Mitigation | The general objectives of the MoU between IMELS and the Ministry of Habitat, Planning and Environment of the Republic of Djibouti are:<br>• to strengthen and coordinate efforts to combat global climate change and address its adverse effects<br>• to implement adaptation actions and opportunities to protect the environment and natural resources<br>The intention is to make a substantial contribution to the implementation of both adaptation and mitigation actions, to proper address and manage the current and future impacts of climate change in Djibouti.<br>The Work Plan has identified the following areas of cooperation :<br>• Environmental governance on mitigation and adaptation activities<br>• Development of renewable energies and increase of energy efficiency<br>• Promotion of sustainable agricultural practices<br>Integrated management of water resources<br><br>Projects approved:<br>- Feasibility study for the realization of two boreholes in the localities of Adbouya and Bondara in the Tadjourah and Dikhil regions, Djibouti March 2018 – December 2019<br><br>- A Nearly Zero Emission Sustainable Building in the | http://www.minambiente.it/pagina/gibuti |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | University of Djibuti (not yet launched, date to be defined. Planned activities: Training of personnel; drafting of a study with proposals of measures and legislative schemes to boost the use of renewable sources, the energy efficiency and the waste recycle.<br><br>- Renewable Energy Potential Assessment in Djibouti. (not yet launched, date to be defined). This project will produce a Study on the potential of solar power, wind energy and geothermal energy in Gibuti. | |
| **MoU on environmental protection and sustainable development cooperation between IMELS and the Egyptian Ministry of Environment, (signed in Paris on 8 December<br><br>2015, duration six years - ongoing)** | **Egypt** | Technology development<br><br>& transfer<br><br>Adaptation | The MoU is intended to develop programmes, initiatives and projects dealing with prevention and/or reduction of environmental pollution, environmental preservation and sustainable development. In particular the cooperation between the Parties will be conducted by means of Capacity building, technology transfer and technical assistance in:<br><br>• promoting measures of adaptation to climate change, with particular linkages to land management, water resources, coastal zone management and sea-level rise;<br><br>• enhancing public awareness, raising activities on climate change and water quality management aimed to enhance local authorities and strengthen the administrative decentralization process .<br><br>The Work Plan has identified the following priority areas of cooperation<br><br>• Management of protected areas<br>• Production of energy from renewable sources<br>• Sustainable management of the waste cycle<br>• Initiatives to promote sustainable public | https://www.minambiente.it/pagina/egitto |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | transports<br>• Capacity building activities | |
| **Technical Agreement on Co-Operation in the field of Mitigation and Adaptation to Climate Change between IMELS and the Ministry of the Environment, Forest and Climate Change of the Federal Democratic Republic of Ethiopia (signed in Marrakech on 18 November 2016 - ongoing)** | **Ethiopia** | Capacity building, training and awareness<br><br>Adaptation and Mitigation | The purpose of this Technical Agreement is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emission development, to ensure energy security and to create adaptation actions and opportunities to protect the environment and natural resources.<br><br>The cooperation is carried out, among others, in the following areas of common interest:<br>• Promotion of good practices exchange, resources sharing, technical co- operation and information exchange with other global climate change initiatives;<br>• Development of fund raising capacities with regard to environmental issues and climate diplomacy;<br>• Development of research activities, also at regional level, including research on the impact of climate change and on the nexus between migration and climate change;<br>• Development of public education and awareness campaigns on mitigation and adaptation to global climate change.<br><br>**February 27 - March 2, 2018** | http://www.minambiente.it/pagina/etiopia |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | Capacity building initiative on "Policy Responses to Climate Change": Sustainable Development And Energy Transition: a 4-day training course focused on sustainable development and energy transition, with the aim of supporting Ethiopian administrators in achieving and monitoring their National Reduction Targets Emissions. | |
| **Contribution Agreement between IMELS and the Global Green Growth Institute (GGGI) for the Cooperation in the field of Climate Chance Vulnerability, Mitigation and Adaptation in Ethiopia**<br><br>**(signed on**<br><br>**29 September**<br><br>**2017, duration one year, expired in 2018)** | **Ethiopia** | Technology development<br><br>& transfer<br><br>Mitigation and Adaptation | The objective of the Project is to support the Ethiopian Government in identifying and promoting projects and technology transfer opportunities, providing ad hoc capacity building activities in the field of renewable energy, early warning system, sustainable agriculture and water resource management with the aim of supporting sustainable development, local job creation and fostering international partnerships.<br><br>A Work Plan has been approved for the strengthening of the national technical capacity and quality of local expertise in environmental management, and above all to strengthen the capacity to effectively manage environmental risks resulting from global climate change.<br><br>The action includes the following components:<br>• Project Design, Monitoring and Evaluation and Green Cities and Green Building's Technologies<br>• Climate Change: science, Impacts and Policy Responses | http://www.minambiente.it/sites/default/files<br><br>/archivio/allegati/sviluppo_sostenibile/contrib<br>ution_agreement_Global_Green_Growth_Inst itute.pdf |
| **Memorandum of Understanding**<br><br>**on** | **Kenya** | Mitigation<br><br>and Adaptation | The objective of this MoU, within the competences of the Signatories, is to promote secure, clean and efficient energy in order to strengthen and coordinate the efforts to combat global climate change, address its adverse effects and reduce vulnerability, to protect the environment and | https://www.minambiente.it/pagina/kenya |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **cooperation in the field of sustainable energy for climate change adaptation and mitigation**<br><br>**between**<br><br>**the Ministry of energy and petroleum (MOEP) of the Republic of Kenya**<br><br>**and**<br><br>**the Ministry for the environment, land and sea (IMELS) of the Italian Republic**<br><br>**(signed in Nairobi on 23 January 2018, duration five years - ongoing)** | | | natural resources, and to stimulate the transition towards a sustainable low-carbon economy.<br><br>Areas of cooperation:<br><br>• support to the implementation, monitoring, reporting and communication of the Nationally Determined Contributions (NDCs) in the renewable energy sector;<br>• support to the development and implementation of policies, strategies and plans in the sustainable energy sector in order to achieve the emission reduction target adopted by the Republic of Kenya;<br>• promotion and development of renewable energies, in particular hydropower, geothermal, biomass, wind and solar;<br>• enhancement of energy efficiency;<br>• promotion and deployment of renewable energy technologies for off-grid rural electrification as decentralized systems;<br>• stimulation and dissemination of the economic and technological transformation for low-carbon, sustainable development.<br>Cooperation activities include capacity–building, exchange of information and documents related to renewable energy and environment, including programs, publications, expertise and study results, joint organization of workshops, seminars and enhancement of public education and awareness campaigns on measures for adaptation to climate change.<br><br>In the implementation of the programs, projects and activities, consideration will be given to the participation of the public, private and non-profit sectors, including, where appropriate, universities, scientific and technical research bodies, non-governmental organizations, as well as institutions on both sides. | |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
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| **MoU on Co-operation in the field of**<br><br>**climate change vulnerability, risk assessment, adaptation and mitigation Between IMELS and the**<br><br>**Ministry of**<br><br>**Energy and Meteorology of the Kingdom Of Lesotho,**<br><br>**( signed in NY on**<br><br>**21 April 2016, duration five years - ongoing)** | **Lesotho** | Technology development<br><br>& transfer<br><br>Adaptation and Mitigation | The purpose of this Memorandum of Understanding is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emission Development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources.<br><br>Cooperation activities are addressed to:<br><br>• enhancement of capacities for the implementation of Mechanisms under the UNFCCC and its related instruments;<br><br>• development of public education and awareness campaigns on mitigation<br><br>and adaptation to global climate change;<br><br>• capacity building for monitoring, reporting on climate issues, such as mitigation and adaptation and will be implemented , among others, by the following means:<br><br>- realization of joint projects;<br><br>- capacity building, technology transfer and technical assistance.<br><br>The approved Work Plan has identified the following intervention lines :<br><br>• Promotion and development of renewable energies<br>• Development of a national system for the measurement, communication and verification of greenhouse gas; | http://www.minambiente.it/pagina/lesotho |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | • actions to tackle the deforestation process and the degradation of wooded areas in synergy with the UN REDD+ Programme<br><br>On April 2018 the joint project "Renewable energy potential maps for Lesotho" has been launched (April 2018-April 2020). Within this project capacity building activities include the training of Local Officers and operators on the use of GIS (Geographic Information System) tools for the implementation of a GIS database for a better management and planning of renewable energies, thus contributing to the achievement of the SDGs and the Paris Agreement | |
| **MoU on cooperation in the field of climate change vulnerability, risk assessment, adaptation and mitigation between IMELS and<br><br>the<br><br>Ministry of the<br><br>Environment, Reclamation and Sustainable Development<br><br>of the Republic of Mali<br><br>(signed in Bonn,** | **Mali** | Technology development<br><br>& transfer<br><br>Adaptation and Mitigation | The Memorandum of Understanding is aimed at strengthening and coordinating the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emission Development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources.<br><br>The Areas of cooperation include:<br><br>• the collection, analysis and dissemination of data related to the observation of climate change and the measurement of its impact on potentially vulnerable economic sectors;<br><br>• support for the implementation, monitoring, reporting and communication of Voluntary National Contributions (NDC); | http://www.minambiente.it/pagina/mali |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **on November 16, 2017, duration five years - ongoing)** | | | • promotion of renewable energy and energy efficiency;<br><br>• promotion of the practices of Climate Smart Agricultural (CSA);<br><br>• sustainable forest management, including the reduction of deforestation and forest degradation and the enhancement of afforestation / reforestation;<br><br>• sustainable and integrated water management.<br><br>These activities aimed at strengthening skills, technical assistance, exchange of experts, organization of workshops and dedicated seminars, encouraging the involvement of the private sector and cooperation between universities and research centers in the two countries.<br><br>The Work Plan has not been approved yet. On 8 May in Bonn was held the first meeting of the Joint Committee where Mali government (the counterparty) expressed a particular interest for energy efficiency projects of public organizations and water management. | |
| **Technical Arrangement on Environmental Protection and sustainable** | **Morocco** | Mitigation and Adaptation | Under this TA the priority sectors of cooperation activities are:<br><br>• Strengthening the implementation of the mitigation and | http://www.minambiente.it/pagina/marocco |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **development cooperation between IMELS and the Ministry delegate in charge of the Environment of the Kingdom of Morocco (signed in NY on 21 April 2016, duration five years - ongoing)** | | | adaptation measures envisaged by the National Voluntary Contributions (NDC), including through technical assistance to feasibility studies for pilot projects on mitigation and the establishment of a monitoring, reporting and verification system NDCs at national level;<br><br>• Capacity building and dissemination of experiences and knowledge at the national and regional level on mitigation and adaptation to climate change;<br><br>• Reinforcement of the national policy of integrated management, at a technical level, of coastal areas;<br><br>• Strengthening of education on the environment and on sustainable development<br><br>The approved Work Plan and related projects focused on some priority areas of cooperation among which Capacity building and dissemination of practices and knowledge at national and regional level on mitigation and adaptation to climate change and strengthening of education on environment and sustainable development .<br><br>On July 2018 the "Project for the energy efficiency of the University Hospital Centre Ibn Rochd in Casablanca" concluded. This project included local training activities for technicians in order to assure a correct and efficient maintenance of plants on the long term carried out in Casablanca on 27 June 2018. | |
| **MoU on Cooperation in the** | **Rwanda** | Technology | The purpose of this MoU is to strengthen and coordinate the efforts to combat global climate change and address | http://www.minambiente.it/pagina/ruanda |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **field of Climate Change vulnerability, risk assessment, adaptation and mitigation between IMELS and the Ministry of Natural Resources of the Republic of Rwanda (signed in Marrakech on 15 November 2016 , duration five years- ongoing)** | | development & transfer<br><br>Adaptation and Mitigation | its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emission Development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources.<br><br>The Work Plan approved in November 2017 focuses, among others, on the following areas of interest:<br><br>• Climate change coordination: putting in place climate change policies and Strategies, Access to the means of implementation like climate finance, Technology and Capacity building, Greenhouse gases inventory and climate Negotiations<br><br>• Energy sector: promotion and development of renewable energies and enhancement of energy efficiency.<br><br>In particular, with regard to Access to the means of implementation, training workshops and meetings to build capacity of all stakeholders in Rwanda (Public, private, NGOs and Researchers) and exchange visits to share experience between specialized public and private Institutions from Rwanda and Italy were planned.<br><br>Capacity building activities are focused on :<br><br>• support to climate change policy and strategies, | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | to climate negotiation and to means of implementation;<br>• strengthening of technologies and capacity;<br>• greenhouse gas inventory.<br>• promotion and development of renewable energies and promotion of energy efficiency;<br><br>In the frame of the project "Sustainable Urban Wetlands Development within Kigali City" (July 2018 – July 2020 ) have been organized in Bologna and in Rome two training sessions ( April 2019 and 10-11 September 2019) for technical and institutional capacity building on management of wetlands. Training has been carried out by the **Africa Center for Climate and Sustainable Development and Agenda 2030**.<br><br>In order to support the Rwandan Government in identifying and promoting projects and technology transfer opportunities and also to provide ad hoc capacity building activities within this MoU, on 15 January 2018 IMELS signed **an agreement with Global Green Growth Institute (GGGI)** | |
| **Memorandum of understanding between IMELS and the Department of Water and Sanitation of the Republic of South Africa on technical cooperation in the field of sustainable water integrated** | **South Africa** | Technology development<br><br>& transfer<br><br>Adaptation and | The objectives of this Memorandum of Understanding are:<br><br>• to strengthen and coordinate the efforts of adaptation to climate change and address its adverse effects;<br>• to promote measures and techniques aimed at enhancing the regional and local resilience in both countries cooperating on the sustainability and the efficiency of water resources;<br>• to develop activities and projects aimed at reducing climate change vulnerability through the provision of sustainable and integrated water management initiatives;<br>• to facilitate cooperation at a sub-national and regional | http://www.minambiente.it/pagina/sudafrica |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **management in response to climate change adaptation and climate resilience (signed in Johannesburg on 8 October 2016, duration five years - ongoing)** | | Mitigation | level with public territorial entities from both countries to address the main topics such as education and training, research, development and innovation, technologies and techniques in all the fields of the Water Management.<br><br>The Work Plan signed on 21 October 2016 focuses on sustainable Water Integrated Management through the following main sectors of intervention: governance, capacity building, pilot projects and initiatives.<br><br>The capacity building activities in the area of water system in South Africa will include :<br>• Training and know how transfer through the involvement of central and local competent authorities, scientific institutions, academia, and key actors in the field of water management<br>• Development of educational programmes in the field of integrated water management system<br>• Study visits in selected sites in South Africa and Europe | |
| **Memorandum of Understanding between the Guateng provincial Government of the Republic of South Africa and Regione Emilia-Romagna of the Republic of** | **South Africa/ Guateng Province** | Technology transfer<br><br>Mitigation and Adaptation | Gauteng Province and Emilia-Romagna Region cooperation aims at enhancing growth. Cooperation projects focus on water resources management and on the development of services for applied meteorology to contrast climate change as well as the development of scientific programs among Universities, in particular with the University of Pretoria to develop cooperation on the exchange of good practices opening at new research, education and training outlooks in the areas of agriculture and agri-food, climate changes and renewable energy.<br><br>An annual bilateral summit involves the respective | MoU Emilia Romagna Region-Guateng Province : https://goo.gl/mNez8h<br><br>http://wwwservizi.regione.emilia-romagna.it/oggetti/doc/X/OGAL2017005078.pdf |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **Italy (signed on 18 October 2016, duration five years- ongoing)** | | | Chambers of Commerce, trade associations, universities, research and training centres. Mutual visit of delegations facilitate synergies with stakeholders, civil society, institutions and the public and private sector for the achievement of the goals.<br><br>**8-10 April 2019** a delegation from Guateng province met representatives of Emilia Romagna Region and carried out some technical visits in the region accompanied by representatives of the Environmental Protection Agency of Emilia Romagna (ARPAE) and IMELS.<br><br>On 9 April in a technical meeting ARPAE introduced its advanced system for seasonal forecasting and climate services for agriculture in the frame of climate changes discussing about the possible replicability and adaptation to the southafrican contest | |
| **MoU on Technical Cooperation in the field of climate change vulnerability risk assessment adaptation and mitigation between IMELS and Ministry of Environment, Natural Resources** | **Sudan** | Adaptation | The purpose of this Memorandum of Understanding is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate the transition towards a sustainable low-carbon economy and to implement adaptation actions and opportunities to protect the environment and natural resources. The Work Plan signed in Bonn on 16 May 2017, focuses on the following areas of interest: | http://www.minambiente.it/pagina/sudan |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **and Physical Development of Sudan (signed in Marrakech on 17 Nov. 2016, duration five years - ongoing)** | | | • Energy sector, Water sector, Waste sector;<br>• Capacity building and pilot projects in order to assess the applicability and the effectiveness of the strategies taken into account.<br>The Joint Committee approved the following two projects:<br>• Supporting Sudan Meteorological Authority (SMA)<br>• Policy responses to climate change: sustainable development and energy transition.<br>Within the project **Policy responses to climate change: sustainable development and energy transition** will be carried out a 3-day training session for 50 public officers, to be held in Khartoum, focused on integrated water management, green cities, renewable energy and off-grid services. | |
| **MoU on cooperation in the field of climate change vulnerability, risk assessment, adaptation and mitigation between IMELS and the Ministry of Tourism and Environmental** | **Swaziland** | Adaptation<br>Mitigation | The purpose of this Memorandum of Understanding is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms to reduce climate change vulnerability and enhance risk assessment, to promote clean and efficient energy, to stimulate the transition towards a sustainable low-carbon economy; to implement adaptation actions and opportunities to protect the environment and natural resources<br>In the Work Plan signed in Johannesburg on July 4th 2017, selected activities and projects were identified with the aim to make a substantial contribution to the | http://www.minambiente.it/pagina/swaziland |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **Affairs of the Kingdom of Swaziland (signed in Bonn on 17 May 2017, duration five years -ongoing)** | | | development and implementation of both adaptation and mitigation actions, to proper address and manage the current and future impacts of climate change in Swaziland, focusing on the promotion of sustainable practices and climate smart agriculture, integrated water management and the promotion of renewable energies and energy efficiency. | |
| **Technical Agreement on cooperation in the field of Energy, Climate Change, Environmental Protection and Sustainable Development between IMELS and the Ministry of Energy, Mines and Renewable energy of the Tunisian Republic (signed in Rome on 9 February 2017 - ongoing)** | **Tunisia** | Technology development & transfer<br><br>Adaptation | The purpose of the agreement signed on 9 February 2017 is to strengthen the effort to combat climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote secure, clean and efficient energy, to stimulate the transition towards sustainable low carbon economy and to implement adaptation actions and opportunities to protect the environment and natural resources.<br><br>The Work Plan of activities includes:<br>• the promotion of renewable energy and energy efficiency;<br>• the implementation, monitoring and communication of NDC (Nationally<br>Determined Contributions);<br>• capacity building, technology transfer and technical assistance;<br>• integrated coastal zone management;<br>• Sustainable waste management<br>• Enhancement of public education and awareness | http://www.minambiente.it/pagina/tunisia |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
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| | | | campaigns on measures or adaptation to climate change.<br><br>Bilateral activities in Tunisia are supported by MEDREC (the Mediterranean Renewable Energy Center), established in 2004 in Tunis by IMELS. | |
| **Technical Arrangement on cooperation in the field of sustainable development between**<br><br>**The Ministry for the Environment, Land and Sea of the Italian Republic (IMELS) and the Ministry of Agriculture, Water Resources and Fisheries of the Tunisian Republic (TMAWRF)**<br><br>**(signed in Rome on 30 May 2018, duration five years - ongoing)** | **Tunisia** | Adaptation and Mitigation | The purpose of this Agreement on sustainable cooperation is to enable and support the implementation of actions aimed at reducing greenhouse gas emissions and climate change vulnerability and building resilience through the<br><br>strengthening and coordination of efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote solutions combining two pillars:<br><br>• climate change adaptation and mitigation, underpinning sustainable management of agricultural production systems<br>• water resources and fisheries<br><br>This Agreement intends to contribute to the objectives of emission reduction and adaptation to climate change set out by the Tunisian Government (Nationally Determined Contributions - NDCs) through projects in the field of agriculture, fishing, water resources and ecosystems.<br><br>The cooperation between the Signatories will be conducted by the following means:<br><br>- realization of joint projects;<br><br>- capacity building, technology transfer and technical | https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/mou_tunisia.pdf |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | assistance;<br><br>- exchange of information and documents, including programs, publications, expertise and study results;<br><br>- exchange of experts, delegation visits and trainees;<br><br>- joint organization of workshops, seminars and other meetings;<br><br>- promotion of private sector participation and activities to implement Public Private Partnership initiatives;<br><br>- realization of common research and development programs/projects;<br><br>- support of multi-stakeholder innovation platforms (hubs) which gather policy makers, development agencies, civil society and the private sector with researchers and research institutions.<br><br>.<br><br>The Work Plan of this Agreement focuses on the promotion of a sustainable tourism through the CSA (Climate Smart Agriculture) that is the FAO approach supported by Italy which strengthens the link between food security and climate adaptation policies and greenhouse gas emission policies. | |
| **Memorandum of Understanding on cooperation in the** | **Zambia** | Adaptation and<br><br>Mitigation | The objectives of this MoU are to develop systematic weather and climate observations and climate change research and to transfer technology for climate change early-warning systems. This cooperation aims at strengthening and coordinating the efforts to combat global climate change and address its adverse effects, | https://www.minambiente.it/pagina/zambia |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| **field of climate change vulnerability, risk assessment, adaptation and mitigation**<br><br>**between**<br><br>**planning**<br><br>**the Ministry for the environment, land and sea of the Italian republic**<br><br>**and**<br><br>**the government of the Republic of Zambia, acting through the Ministry of national development**<br><br>**(signed in Rome on 30 November 2018)** | | | to support mechanisms to reduce climate change vulnerability and enhance risk assessment, to implement adaptation actions and opportunities to protect the environment and natural resources, to promote secure, clean and efficient energy and to stimulate the transition towards a sustainable low-carbon economy.<br><br>Capacity building activities focus on the promotion of Climate Smart Agricultural (CSA) practices, of renewable energies and energy efficiency including off-grid renewable energy technologies for rural electrification as decentralized systems, in order to achieve the target established by the Republic of Zambia as well as the promotion of the sustainable use of resources. | |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| **CENTRAL AND LATIN AMERICA** | | | | |
| **MoU between IMELS and the Ministry of the Environment and Sustainable development of the Republic of Argentina**<br><br>**(signed in Buenos Aires on 8 May 2017)** | **Argentina** | Technology transfer & technical assistance<br><br>Mitigation and Adaptation | The purpose of this Mou is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for vulnerability and regional risk assessment related to climate change, to encourage and communicate low-emission economic and technological transformation, to ensure energy security, to implement adaptation actions and opportunities to protect the environment and the natural resources in Argentina. It provides for capacity building on UNFCCC mechanisms and its related instruments and on monitoring and reporting of climate issues such as mitigation and adaptation.<br><br>The Medium Term Work Plan was approved in 2018. Its objectives are to identify and select activities and projects consistent with the general objectives of the MoU, with the intention to make a substantial contribution to the implementation of both adaptation and mitigation actions, to proper address and manage the current and future impacts of climate change in Argentina. The measures for the implementation of activities also encompass institutional enhancement, capacity building on human resources and inter-institutional coordination for planning and management on adaptation to the climate change, as well as the sharing of resources, technologies and information, exchanging of experiences, best practices, trainees and personnel.<br><br>The main areas of cooperation at interest are:<br><br>• Improvement in Climate Data Collection, Management and Forecasting: development of early warning systems, data monitoring, recording and acquisition for vulnerability and risk assessment to climatic change;<br>• Energy sector: development of renewable energy sources and enhancement of energy efficiency;<br>• Sustainable forest management: promotion of sustainable forests management within local communities, forest restoration ,deforestation and forest degradation;<br>• Agricultural sector: promotion of sustainable agriculture and livestock;<br>• Transport sector: promotion of an efficient and low carbon emission transport system | http://www.minambiente.it/pagina/argentina |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| **Memorandum of understanding on Cooperation in the field of Climate Change Vulnerability, Risk Assessment Adaptation And Mitigation, between IMELS and the Ministry of Science, Technology and Environment (CITMA) of the Republic of Cuba**<br><br>**(Signed in Havana on 14 July 2017)** | **Cuba** | Technology development & transfer<br><br>Adaptation and Mitigation | This MoU intends to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for reducing the climate change vulnerability and strengthening risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation towards sustainable development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources.<br><br>Priority areas of cooperation are:<br>• collection, analysis, and dissemination of meteorological and sea-level data;<br>• support to the implementation, monitoring, reporting and communication of NDCs;<br>• enhancement of capacities for the implementation of mechanisms under the UNFCCC and its related instruments;<br>• support to engineering projects related to adaptation to climate change, particularly in the coastal zone;<br>• stimulation and dissemination of the economic and technological transformation to low emission development;<br>• promotion and development of the use of renewable energies, in order to achieve the target established by both countries in their DCs;<br>• development of public education and awareness campaigns on mitigation and adaptation to global climate change;<br>• exchange of human resources and technical cooperation with other global climate change initiatives with countries in the region, in particular with small island developing and Coastal States;<br>• development of capacities for regional research activities, including impact and adaptation modeling.<br><br>The Medium Term Work Plan was approved in Nov. 2017. Its objectives are to identify, select and plan activities and projects consistent with the MoU general objective, to strengthen and coordinate efforts to combat the adverse effects of climate change and to support the implementation of mechanisms for regional climate change vulnerability and risk assessment, adaptation and mitigation, in the Republic of Cuba. It focuses on the following areas of interest:<br>• Early Warning Systems, data monitoring, recording and acquisition for | http://www.minambiente.it/pagina/cuba |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| | | | vulnerability and risk assessment of the Cuban coastal zone to climatic change;<br>• Use of computational tools and numerical models to assess scenarios in coastal areas vulnerable to sea-level rise due to climate change and/or flooding by extreme weather events;<br>• Resilience and adaptation/mitigation actions in coastal areas, particularly linked to coastal protection-restoration and tourism development;<br>• Assessment of Renewable Energy availability and needs in Cuba;<br>• Strengthening disaster risk governance and national capacities for disasters prevention, mitigation, preparedness<br><br>Various projects have been approved within this MoU in 2018. Among them, project "Improve national capacities for the introduction and use of innovative and advanced technologies and tools that strengthen vulnerability, risk, adaptation and mitigation assessments of climate change in Cuban marine ecosystems" aims at carrying out a study on Cuban marine ecosystem to support its resilience to sea level and temperature rise and ocean acidification. A study of the energy potential from sea is also foreseen. | |
| **Memorandum of Understanding on Cooperation in the field of Sustainable Energy for Climate Change Adaptation and Mitigation between IMELS and the Ministry of Energy and Mines(MINEM) of the Republic of Cuba**<br><br>**signed in Havana on 28 May 2018** | **Cuba** | Technology transfer & technical assistance<br><br>Adaptation and Mitigation | This MoU intends to promote a secure, clean and efficient energy in the Republic of Cuba in order to strengthen and coordinate the efforts to combat global climate change, address its adverse effects and reduce vulnerability, to protect the environment and natural resources, and to stimulate the transition towards a sustainable low-carbon economy.<br><br>Priority areas of cooperation are:<br>• promotion, absorption and development of technologies that use renewable energy sources (biomass, solar photovoltaic, solar thermal power, wind power, solid urban waste and hydropower;<br>• promotion and deployment of renewable energy technologies for electrification and improvement of the quality of service in homes and isolated systems of the national electricity grid;<br>• support to the implementation, monitoring, reporting and communication of the NDCs in the renewable energy sector;<br>• support to the development and implementation of policies, strategies and plans in the sustainable energy sector in order to achieve the emission reduction target adopted by the Republic of Cuba;<br>• enhancement of energy efficiency;<br>• stimulation and dissemination of the economic and technological transformation | http://www.minambiente.it/pagina/cuba<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/MoU_Cuba_28052018.pdf |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| | | | for low-carbon, sustainable development.<br><br>The Medium Term Work Plan was approved in Dec. 2018. It focuses on the following areas of interest:<br><br>• energy sector: promotion and development of renewable energies and enhancement of energy efficiency;<br>• capacity building and training sector: strengthening the national technical capacity and quality of local expertise in environmental management, and increasing the public capacity to effectively manage environmental risks resulting from global climate change.<br><br>The activities under the capacity building and training sectors will be implemented through:<br><br>• improvement of the system for evaluating and assessing mitigation and adaptation measures;<br>• ensuring participation of the society, local communities, indigenous peoples women, men, youth, civil organizations and private sector in national and sub national climate change planning;<br>• organization of workshops, presentations and meetings (also b2b) for technology transfer;<br>• exchange of experiences and best practices, trainees and personnel<br><br>Two projects have been approved in March 2019:<br>- "Strengthening of national capacities for the successful development of the national program of renewable energy sources". It aims to contribute to the national plan for rural electrification, through the use of off-grid systems based on solar and wind energy; training on the installation and maintenance of installed systems is also provided;<br>- "Development and Implementation of a Electricity Generation Forecast System for wind and photovoltaic parks". It involves the creation of a system for forecasting energy production from wind and photovoltaic parks as well as training activities on the use of new technologies | |
| **Memorandum of Understanding on Cooperation in the field of Climate Change Vulnerability, Risk Assessment,** | **Costa Rica** | Technology development & transfer<br><br>Technical | The MoU promotes coordinated efforts to contrast climate change, encouraging the realization of systems for risk assessment through the promotion of clean energy for the economic and technological transformation towards low-carbon systems. The cooperation activities aim at addressing the drivers of deforestation and land degradation, the reduction of deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks. | http://www.minambiente.it/pagina/costa-rica |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| **Adaptation and Mitigation between IMELS and Ministry of the Environment and Energy of the Republic of Costa Rica (MINAE)**<br><br>**(signed in Rome on 27 May 2016)** | | assistance | Capacity building and technology transfer is focused on monitoring and reporting on the following climate issues:<br><br>• mitigation and adaptation<br>• integrated management of maritime and coastal areas<br>• sustainable mobility and transport<br>• integrated water management and urban waste management<br><br>Within this cooperation joint projects, exchange of information, exchange of experts as well as joint workshops and meetings have been implemented.<br><br>The Medium Term Work Plan of the MoU was approved in Feb. 2018, focusing on the following areas of interest:<br>• Enhancement of energy efficiency and conservation, promotion of non-conventional renewable energies;<br>• Promotion of electro mobility of private and public transport to develop low carbon towns resilient at climate change;<br>• Reduction of emissions in the forestry sector, in particular from deforestation, and promotion of a sustainable forest management (REDD+);<br>• Promotion of sustainable and low carbon agricultural practices;<br>• Enhancement of waste regulatory framework to reduce GHG emissions and promotion of proper waste collection and treatment in urban areas;<br>• Strengthening of the disaster risk governance and national capacities for disasters prevention, mitigation and preparedness, to address environmental concerns and risks, resulting from global climate change;<br>• Integrated management of water resources<br><br>The activities will be implemented through capacity building and sharing of resources, technologies and information. | |
| **Memorandum of Understanding on Cooperation in the field of Biodiversity, Climate Change Vulnerability, Risk Assessment,** | **Mexico** | Technology transfer<br><br>Adaptation | The purpose of this MoU is to strengthen and coordinate the efforts mainstreaming biodiversity in key sectors, to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to stimulate and disseminate the economic and technological transformation to low emissions, to implement adaptation actions and opportunities to protect the environment, ecosystems, biodiversity and ecosystem services in Mexico. | https://www.minambiente.it/pagina/messico<br><br>https://www.minambiente.it/sites/default/fi |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| **Adaptation and Mitigation between IMELS and the Ministry of Environment and Natural Resources of the United Mexican States (SEMARNAT)**<br><br>**signed on 20 July 2016** | | and Mitigation | The Medium Term Work Plan of the MoU was approved in March 2017. It aims to focus on the following areas of interest:<br><br>• Enhancement of capacities for the implementation of Mechanisms under the UNFCCC and its related instruments (i.e. Paris Agreement);<br>• Climate change mitigation and adaptation in biodiversity, forestry and natural protected areas;<br>Further areas of interest might be envisaged in waste and water sectors<br><br>The activities will be implemented through capacity building measures, exchange of experiences, trainees and personnel, sharing of resources, technologies and information | les/archivio/allegati/sviluppo_sostenibile/mou_italia_messico_luglio2016_eng.pdf<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/work_plan_messico_03032017_eng.pdf |
| **MoU on Cooperation in the field of Climate Change Vulnerability, Risk Assessment, Adaptation and Mitigation between IMELS and the Ministry of Environment and Sustainable Development of the Republic of Paraguay (MADES)**<br>**signed on 7 November 2018** | **Paraguay** | Technology transfer & technical assistance<br><br>Mitigation and Adaptation | The purpose of this MoU is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms to reduce climate change vulnerability and enhance risk assessment, to promote secure, clean and efficient energy and to stimulate the transition towards a sustainable low-carbon economy through the implementation of adaptation actions and opportunities to protect the environment and natural resources.<br><br>Priority areas of cooperation are:<br><br>• collection, analysis and dissemination of data relevant to the observation of climate change and the measurement of its impacts on the potentially vulnerable economic sectors including strengthening of the early warning System and the risk assessment;<br>• support for implementation, monitoring, reporting and communication of the Nationally Determined Contributions (NDCs);<br>• sustainable management of forests including reduction of deforestation and forest degradation (REDD+), support to reforestation and afforestation programs providing the enhancement of forest carbon stocks;<br><br>• promotion of sustainable integrated water management;<br>• promotion and development of renewable energies (solar, wind and biomass);<br>• biodiversity preservation and reduction of environmental degradation;<br>• promotion of sustainable crop and livestock production practices for greater food security and greenhouse gas emissions reduction, also through the | https://www.minambiente.it/pagina/paraguay<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/MoU_Paraguay_eng_08112018.pdf |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| | | | application of the climate-smart agriculture approach (CSA);<br>• exchange of human resources, technical cooperation and information with other global climate change initiatives;<br>• stimulation and dissemination of the economic and technological transformation for low-carbon, sustainable development | |
| **Memorandum of Understanding on Cooperation in the field of Climate Change Vulnerability, Risk Assessment, Adaptation and Mitigation between the Ministry of the Environment of Perù (MINAM) and IMELS**<br><br>**(Signed in Rome on 18 July 2016)** | **Peru** | Technology development & transfer and technical assistance<br><br>Adaptation and Mitigation | The purpose of this MoU is to combat the effects of climate change, promote clean energy and economic and technological transformation towards low-emission development, ensure energy security, protect the environment and natural resources and promote adaptation policies The activities will be implemented through:<br><br>• joint projects<br>• capacity building, technology transfer and technical assistance<br>• exchange of information and materials;<br>• exchange of experts, delegations visits and trainees<br>• joint organization of workshops, seminars or other meetings<br>• joint participation of experts to events and projects<br>• promotion of private sector participation and activities to implement Public Private Partnership initiatives.<br>The Medium Term Work Plan was approved in Aug. 2018. Its objectives are:<br><br>• to strengthen and coordinate efforts to combat global climate change and address its adverse effects;<br>• to support mechanisms to reduce climate change's impact and variability, increasing the adaptive capacity and disaster risk management, providing better resilience to vulnerable sectors;<br>• to support the key sectors emission reduction activities to drive the low emission of greenhouse gases to promote the development transformation process, in the framework of the Paris Agreement;<br>• to stimulate and disseminate the economic and technological transformation to low emissions;<br>• to implement adaptation actions and opportunities to protect the environment and the natural resources.<br>The intention is to make a substantial contribution to the implementation of both adaptation and mitigation actions, to proper address and manage the current and | http://www.minambiente.it/pagina/peru<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/mou_peru_18072016.pdf<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/Peru_piano_lavoro.pdf<br><br>https://www.minambiente.it/pagina/seconda-riunione-del-comitato-congiunto-approvato-il-progetto |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| | | | future impacts of climate change in Peru. The foreseen lines of interventions are:<br>• Information for risk management in the face of the effects of climate change;<br>• generate enabling conditions to implement the NDCs in adaptation and mitigation;<br>• implementation for prioritized NDCs in adaptation and mitigation;<br>• environmental governance in prioritized sectors in mitigation and adaptation.<br><br>In Dec. 2018 the project "Supporting NDC's implementing in Peru" was approved, aimed at achieving the mitigation and adaptation goals adopted with the Paris Agreement also at regional level. It proposes an integrated approach aimed at enhancing data processing and collection capacities for managing risks deriving from climate change and at promoting public training and awareness activities. The project will focus on specific sectors such as agriculture; forests, including more sustainable land use; water resources and health.<br><br>The expected outputs are:<br><br>• enhancement of the system for collection, processing and dissemination of climate change mitigation and adaptation data as well as of information at national and sub-national level with specific reference to wetlands, glaciers and frozen lakes;<br>• support for NDCs governance through the promotion of institutional capacities and of coordination among the various actors involved;<br>• implementation of NDCs at sub-national level in the agricultural, forestry and land use sectors<br>• | |
| **Memorandum of Understanding on Cooperation in the field of Climate Change Vulnerability, Risk Assessment, Adaptation and Mitigation between the Ministry of the Environment and Natural Resources of the** | **Dominican Republic** | Technical assistance & technology transfer<br><br>Mitigation and Adaptation | The purpose of this MoU is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms to reduce climate change vulnerability and enhance risk assessment, to promote secure, clean and efficient energy and to stimulate the transition towards a sustainable low-carbon economy through the implementation of adaptation actions and opportunities to protect the environment and natural resources.<br><br>Cooperation will focus, in particular, on the following areas:<br><br>• collection, analysis and dissemination of climate change observation data, and measurement of its impacts on potentially vulnerable economic sectors;<br>• support for the implementation, monitoring, reporting and communication of NDCs;<br>• elaboration of national policies and special programs for coastal zone | https://www.minambiente.it/pagina/repubblica-dominicana |

| Programme or project title | Recipient country/ | Targeted area | Description of programme or project | Comments |
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| **Dominican Republic (SEMARENA) and IMELS**<br><br>**(Signed on 15 February 2019)** | | | management, disaster management, impact assessment and community level mitigation and adaptation measures;<br>• promotion of sustainable integrated water management;<br>• promotion and development of renewable energies;<br>• promotion of sustainable crop and livestock production practices and application of the "climate smart agriculture" (CSA) approach;<br>• biodiversity preservation and reduction of environmental degradation;<br>• sustainable waste management;<br>• sustainable management of forests including reduction of deforestation and forest degradation (REDD +), support to reforestation and afforestation programs providing the enhancement of forest carbon stocks;<br>• exchange of human resources, technical cooperation and information with other global climate change initiatives;<br>• stimulation and dissemination of the economic and technological transformation for sustainable low-carbon development | |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **SMALL ISLAND DEVELOPING STATES (SIDS)** | | | | |
| **Cooperation Program Italy-Pacific Small Island Developing States (PSIDS)**<br><br>**2007 ongoing** | **Pacific Small Island - Cook Islands, Fiji, Kiribati, Micronesia, Marshall Islands, Nauru, Niue, Solomon Islands, Palau, Papua New Guinea, Samoa, Tonga, Tuvalu, Vanuatu** | Technology development & transfer<br><br>Adaptation and mitigation | The cooperation activities with the Pacific Small Island Developing States (PSIDS) are developed in the framework of a partnership launched in 2007, with the signing of a 1st MoU, then expanded through subsequent addenda. In the first 10 years of cooperation (2007-2017) 29 projects have been approved. The activities have contributed to the achievement of the Agenda 2030 Sustainable Development Goals, homogeneously focusing on climate change mitigation and adaptation issues. To date, 14 beneficiaries are participating in the program. Among completed and ongoing projects, 10% focus on training of young officials from local governments to strengthen their skills for negotiation and implementation of international agreements on oceans and climate.<br>Between 2018 and 2019, the funding for climate and ocean training projects dedicated to young officials has increased, in line with Article 11 of the Paris Agreement. An ambitious training program has been promoted aimed at strengthening the national capacity in the framework of the Paris Agreement and the 2030 Agenda for Sustainable Development. The Programme includes among others, the following capacity building projects:<br>• AOSIS Fellowship Programme (2017-2018);<br>• UNFCCC "Capacity Award Programme to Advance Capabilities and Institutional Training in one Year (CAPACITY) for 5 years (2018 – 2022);<br>• Tonga "Strengthening of National Capacity for the Follow-up to, and Implementation of the Paris Agreement, the Sustainable Development Goals and related Major International Agreements" (2018);<br>• Tonga "2019 Tonga Fellowship on the Environment and Ocean (TFEO)";<br>• Fiji "Fellowship for Capacity Building on Climate Change and Oceans" | https://www.minambiente.it/pagina/isole-del-pacifico<br><br>https://www.minambiente.it/pagina/gli-ambiti-della-cooperazione |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of Understanding on Co-Operation on Climate Change Vulnerability, Adaptation and Mitigation between IMELS and the Governments of Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and Grenadines, Suriname, Trinidad and Tobago**<br><br>**signed in 2015, 2016, 2018 by 11 countries out of 15 of CARICOM area** | **CARICOM/ Antigua and Barbuda, Bahamas, Belize, Dominica, Grenada, Guyana, Haiti, St. Kitts and Nevis, St. Vincent and Grenadines, St. Lucia, Suriname** | Adaptation and Mitigation | The Mou has been signed so far by 11 CARICOM Countries: Antigua and Barbuda, Bahamas, Belize, Dominica, Grenada, Guyana, Haiti, St. Kitts and Nevis, St. Vincent and Grenadines, St. Lucia, Suriname. It aims at facilitating the development and implementation of instruments under UNFCCC aiming at greenhouse gas emission reduction. Sectors of cooperation include:<br><br>• adaptation to climate change, and protection from the vulnerability to sea level rise and climate variability in the region;<br>• identification, implementation, reporting and assessment of the Intended Nationally Determined Contributions;<br>• development and dissemination of the use of renewable energies;<br>• transfer of scientific and technical knowledge and experience, and technology transfer;<br>• exchange of experts, scientists and researchers;<br>• enhancing capacities for the implementation of Mechanisms under the UNFCCC and its related instruments;<br>• promotion of joint ventures between the private sectors of the Parties.<br><br>The Work Plan is broken down in two Programmes:<br><br>• The **Sustainable Energy Programme**, articulated in five sub-programmes:<br>1. Development of climate change adaptation measures<br>2. identification, implementation, reporting and assessment of the Intended Nationally Determined Contributions<br>3. Assessment of energy requirements and strengthening of energy policies and action plans<br>4. Rural Electrification<br>5. Development of renewable energy sources<br><br>• The **Climate Change Adaptation Programme,** including two sub-programmes: | http://www.minambiente.it/pagina/paesi-caricom |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| | | | 1. Risks Reduction from extreme weather events;<br><br>2. Protection and conservation of marine and terrestrial ecosystems and biodiversity<br><br>To date (2019) 23 projects have been approved, implemented in the states of Antigua and Barbuda, Bahamas, Belize, Dominica, Grenada, Guyana, Haiti, St. Lucia, St. Vincent and the Grenadines, St. Kitts and Nevis, Suriname, with a total budget of over 12 million dollars (6 millions for 2016-2017; 6 millions for 2018-2019). | |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of Understanding on Co-operation for the Development of Renewable Energy Sources and Mitigation and Adaptation to Climate Change in the Caribbean Region between IMELS and the Caribbean Community Climate Change Centre (5Cs)**<br><br>**signed in Rome on 20 November 2015** | **CARICOM Climate Change Centre (5C) (Belize)** | Technology development<br><br>& transfer<br><br>Mitigation and Adaptation | The MoU with the Caribbean Community Climate Change Centre (5C) aims at supporting the implementation of the MoU between IMELS and CARICOM Countries to help them to implement projects and initiatives adopted by the Joint Committee.<br><br>The cooperation activities are aimed at enhancing regional capabilities for responding effectively to the negative effects of climate change in the region, also providing technical support in the area of climate change mitigation and adaptation, including the development and utilization of renewable energy sources, and support mechanisms for building adaptation capacity and resilience to climate change vulnerability, including disaster risk assessment and reduction, and the development of conservation measures that minimize and address the impact of climate change and other anthropogenic activities on coastal and marine ecosystems.<br><br>In the implementation of such programmes, projects and activities, consideration shall be given to the participation of the public and private sectors and, where necessary, universities, scientific and technical research bodies and non-governmental organisations within Italy and CARICOM Member States. | https://www.minambiente.it/pagina/paesi-caricom<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/protocollo_intesa_cccc_belize_novembre_2015.pdf<br><br>https://www.minambiente.it/sites/default/files/archivio/allegati/sviluppo_sostenibile/addendum_MOU_MATTM_5C_07112017_Open Source.pdf |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of understanding on Cooperation in the field of Climate Change Vulnerability, Risk Assessment, Adaptation and Mitigation between IMELS and the Ministry of the Environment and Energy of the Republic of Maldives**<br><br>**Signed in Paris on 9th December 2015** | **Maldives** | Technology development & transfer<br><br>Adaptation and Mitigation | The main objective of this MoU is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms for regional climate change vulnerability and risk assessment, to promote clean and efficient energy, to stimulate and disseminate the economic and technological transformation to low emission Development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources.<br><br>The Work Programme, approved in 2016, focuses on the following areas of interest:<br><br>1) improving climate data collection, management and forecasting: early warning systems;<br><br>2) water scarcity challenges (water treatment, mainly water desalinization);<br><br>3) renewable energies (promotion and development of the use of renewable energies, in order to achieve the established national target)<br><br>This cooperation includes, among others, the following capacity building projects:<br>• Support programme for climate change 2017-2018 – AOSIS. Training project for 4 young negotiators from AOSIS states, aiming at building capacity in international negotiations, with particular attention to topics such as: oceans, climate change, sustainable development and implementation of the Paris Agreement and the 2030 Agenda in the Small Developing Islands (2018) | http://www.minambiente.it/pagina/maldive |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of understanding on Cooperation in the field of Renewable Energy, Construction Energy Efficiency and Climate Change between IMELS and the Ministry of Energy and Public Utilities of the Republic of Mauritius**<br><br>**Signed in Port Louis on 12 February 2018** | **Mauritius** | Technology transfer & technical assistance<br><br>Adaptation and mitigation | The objective of this MoU is to promote and develop scientific, technical and economic relations in the fields of renewable energy, construction energy efficiency and climate change, on both aspects of mitigation and adaptation<br><br>The areas of cooperation include, among others:<br>• renewable energy technology, including but not limited to wind, solar, waste to energy, wave energy and biomass;<br>• training in energy efficiency;<br>• exchange of information and experts with regards to renewable energy, construction energy efficiency and climate change, related policies, legal framework, regulation, scientific research and in other relevant fields;<br>• training programs, seminars and scientific visits;<br>• promotion of latest and new technologies in the fields of Renewable Energy and Energy Efficiency;<br>• promotion of sustainable integrated water management, to meet the needs of the population and water use efficiency; | https://www.minambiente.it/pagina/mauritius |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of understanding on Cooperation in the field of Climate Change Vulnerability, Risk Assessment, Adaptation and Mitigation between IMELS and the Ministry of Public Works, Infrastructures, Natural Resources amd Environment of the Democratic Republic of Sao Tome and Principe**<br><br>**Signed in** | **São Tomé and Príncipe** | Technology transfer & technical assistance<br><br>Adaptation and Mitigation | The purpose of this MoU is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects, to support mechanisms to reduce climate change vulnerability and enhance risk assessment, to promote secure, clean and efficient energy and to stimulate the transition towards a sustainable low-carbon economy through the implementation of adaptation actions and opportunities to protect the environment and natural resources.<br><br>The areas of cooperation include:<br><br>• collection, analysis and dissemination of data relevant to the observation of climate change and the measurement of its impacts on the potentially vulnerable economic sectors, including strengthening of early warning system and risk assessment;<br>• support for the implementation, monitoring, reporting and communication of the Nationally Determined Contributions (NDCs);<br>• elaboration of national policies and special programs for coastal zone management, disaster management, impact assessment and community level mitigation and adaptation measures;<br>• promotion and development of renewable energies;<br>• biodiversity preservation and reduction of environmental degradation;<br>• promotion of sustainable integrated water management;<br>• promotion of climate-smart agriculture approach (CSA);<br>• sustainable waste management;<br>• exchange of human resources, technical cooperation and information with | https://www.minambiente.it/pagina/sao-tome-e-principe |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of understanding on Cooperation in the field of Sustainable Energy for Climate Change Adaptation and Mitigation between IMELS and the Ministry of Environment, Energy and Climate Change (MEEC) of the Republic of Seychelles** | **Seychelles** | Technology transfer & technical assistance<br><br>Adaptation and Mitigation | The objective of this MoU is to promote secure, clean and efficient energy in order to strengthen and coordinate the efforts to combat global climate change, address its adverse effects and reduce vulnerability, to protect the environment and natural resources, and to stimulate the transition towards a sustainable low-carbon economy<br><br>The cooperation will focus on the following areas of common interest:<br><br>- support to the development and implementation of policies, strategies and plans in the sustainable energy sector, in order to achieve the emission reduction target adopted by the Republic of Seychelles;<br>- promotion and development of renewable energies, in particular solar, wind, biomass and hydropower;<br>- assessment and support of the Nationally Determined Contributions;<br>- enhancement of energy efficiency;<br>- promotion and deployment of renewable energy technologies for off-grid application as decentralized systems especially for outlying islands;<br>- stimulation and dissemination of the economic and technological | https://www.minambiente.it/pagina/seychelles |

| Programme or project title | Recipient country/ region | Targeted area | Description of programme or project | Comments |
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| **Memorandum of Understanding on cooperation in the field of climate change vulnerability, risk assessment, adaptation and mitigation between IMELS and the Ministry of Adaptation and Mitigation between IMELS and the**<br><br>**Ministry of Production, Environment, Industry and Handcrafts (VP-MAPEATU) of the Union of Comoros** | **Union of Comoros** | Technology development & transfer<br><br>Adaptation And Mitigation | The main objective of this MoU is to strengthen and coordinate the efforts to combat global climate change and address its adverse effects. The implementation of adaptation actions is aimed at reducing vulnerability and building resilience taking into account the urgent and immediate needs of this developing country that is particularly vulnerable. This cooperation aims also to promote clean and efficient energy; to stimulate and disseminate the economic and technological transformation to low emission Development in ensuring energy security and creating adaptation actions and opportunities to protect the environment and natural resources<br><br>In the implementation of projects in the Comores Islands, the promotion of renewable energies is considered of priority importance to achieve the objectives defined by the government of Comores as well as the development of programs and policy to contrast soil degradation .<br><br>The areas of cooperation include:<br><br>• collection, analysis, and dissemination of meteorological and sea level data<br>• sustainable waste management;<br>• promotion and development of the use of renewable energies;<br>• development of public education and awareness campaigns on mitigation and adaptation to global climate change; | http://www.minambiente.it/pagina/unione-delle-comore |

| Programme or project<br><br>title | Recipient country /<br><br>region | Targeted area | Description of programme or project | Comments |
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| **MULTILATERAL COOPERATION** | | | | |
| **Initiative for Climate Action Transparency (ICAT), a multi-stakeholder partnership by the Children's Investment Fund Foundation (CIFF); Climate Works Foundation (CWF); the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU); and the Italian Ministry for the Environment, Land and Sea (IMELS); 2015-ongoing** | from Africa: Botswana, Ethiopia, Ghana, Kenya, Morocco, Mozambique, Rwanda, Senegal, South Africa, Sudan, Tanzania, Tunisia<br><br>from Asia: Bangladesh, Cambodia, China, India, Indonesia, Maldives, Philippines, Sri Lanka, Thailand, Viet Nam<br><br>from Latin America & Caribbean: Argentina, Belize, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Mexico, Peru, Trinidad & Tobago | Adaptation and Mitigation | In November 2015 The Ministry for the Environment, Land and Sea, has adhered to the Initiative for Climate Action Transparency (ICAT). IMELS has contributed with 5 million Euro to the ICAT trust fund, managed by UNOPS, to assist 11 beneficiary countries (Argentina, Belize, China, Cuba, Ethiopia, Iran, Maldives, Ruanda, Sudan, Tunisia, Vietnam). ISPRA ( the Italian Institute for Environmental protection and research) , the technical branch of IMELS, is involved as ICAT implementing partner both in the definition of the methodological toolbox and in the in-country capacity building activities that will carried on during years 2020/2021. ICAT is a voluntarily and multilateral initiative to which adhere both Donor Countries and non-governmental actors. This initiative was founded to respond to the critical need to support improved transparency and capacity building under the Paris Agreement. ICAT integrates guidance, capacity building and knowledge sharing to engage countries in the use of a common framework to assess the impacts of their policies and actions and report progress, fostering greater transparency, effectiveness and ambition. The Initiative will improve the availability and quality of data and enable countries to promote efficient, cost-effective policies. ICAT will also provide a platform for countries to share lessons learned and build mutual confidence in their climate actions. The initiative is working with developing countries to strengthen capacity to assess climate actions (in the context of their NDCs) and report their progress in line with the Paris Agreement, based on individual country needs. ICAT works closely with governments, along with public agencies, higher education institutions and civil society bodies, to strengthen institutional arrangements, processes and procedures. The initiative supports in-country capacity development programmes through training modules on measurement, | https://www.minambiente.it/pagina/unops-initiative-climate-action-transparency-icat |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | reporting and verification (MRV) of policies and actions.<br><br>**In September 2018 a Contract Agreement between ISPRA (Italian Institute for Environmental Protection and Research) and UNEP-DTU** has been signed ( duration 18 months) for capacity building activities on the themes of transparency and reporting of the commitments undersigned by the Parties as established in the Paris Agreement (art 13) in 11 beneficiary Countries (Argentina, Belize, Botswana, China, Cuba, Ethiopia, Iran, Maldives, Sudan, Tunisia and Vietnam. Argentina, Belize, Botswana, China, Cuba, Ethiopia, Iran, Maldives, Sudan, Tunisia and Vietnam). ISPRA will transfer acquired experience in counting activities of the greenhouse gas emissions carrying out training initiatives addressed to officers and to key stakeholders of beneficiary countries.<br><br>In 2019 ISPRA has provided technical support to national counterparts in setting priorities, mapping stakeholders and identifying needs in terms of capacity building for climate action transparency. In 2019 in each Country an initial Workshop for the definition of the priority intervention lines has been organized.<br><br>Only Belize, Maldives and Vietnam have formalised the participation with an agreement and the definition of the Work Plan.<br><br>The main categories of activities collaboratively defined for each country are:<br><br>**Belize** – official counterpart: Ministry of Agriculture, Fisheries, Forestry, the Environment and Sustainable | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | Development and Immigration<br><br>WP priorities: 1) Clarity on NDC and NDC action indicators for tracking progress and achievement; 2) Improvement of existing MRV mechanisms to incorporate new indicators; 3) Clarity and formalized roles, mandates and tasks of the institutions involved in MRV; 4) Enhanced capacity and tools for MRV.<br><br>Capacity building activities: UDP's and ISPRA's main technical support work included the preparation of the scoping mission (with all associated communications and documents), the scoping mission itself, reviewing national policies that could potentially be used to perform impact assessments (GHG, SD and TC) using ICAT methodologies, reviewing the scope of new upcoming climate related activities to identify potential overlaps and avoid duplication of work; adjustments to work plan and ToR based on new available information; and regular mail communications and calls to discuss new developments.<br><br>**Maldives** – official counterpart: Ministry of Environment<br><br>Waste management<br><br>WP priorities: 1) Data collection and management for waste management MRV; 2) Capacity building for MRV purposes of stakeholders involved in waste management; 3) Creating enabling environment for continuous data reporting and sharing<br><br>Capacity building activities: UDP's and ISPRA's main technical support work included regular teleconferences since a desk review of key issues, preparation of the scoping mission (with all associated communications and documents); the scoping mission itself; development of full logical framework and alignment with ICAT goals, guidance on the drafting the MOU and Terms of Reference, | |

| Programme or project title | Recipient country / region | Targeted area | Description of programme or project | Comments |
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| | | | addressing comments and clarifications on MOU, and regular mail communications and calls to discuss new developments.<br><br>**Vietnam** – official counterpart: Ministry of Natural Resources and Environment<br><br>WP priorities: 1)Tracking progress of NDC implementation at sector levels and aligning data collection systems with MRV/transparency at national level through the GHG inventory system. 2) Integrated assessment of NDC and SDG implementation at both sector and national levels, using ICAT methodologies.<br><br>Capacity building activities: UDP's and ISPRA's technical support in the inception phase has consisted of writing the ICAT Vietnam scoping report and clarifying needs and gaps at sector level (energy and agriculture) as well as national level regarding the status of the national MRV/transparency system, where other support providers are active and what is the niche, ICAT can fill. The result of this technical analysis is reflected in the ICAT work plan. To fill capacity gaps for development of Vietnam's MRV/transparency system, it was decided to focus on the use of ICAT methodologies for impact assessment of climate policies and actions at sector level to track of progress of NDC implementation. | |