



2013 Italy Climate Policy Progress Report

Submitted to the European Commission pursuant to Decision No 280/2004/EC, Article 3(2),

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References

1 Introduction

This report is submitted by Italy under Decision No. 280/2004/EC, in accordance with this Decision article 1 establishes a mechanism for:

- (a) monitoring 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;
- (b) evaluating progress towards meeting commitments in respect of these emissions by sources and removals by sinks;
- (c) implementing the UNFCCC and the Kyoto Protocol, as regards national programs, greenhouse gas inventories, national systems and registries of the Community and its Member States, and the relevant procedures under the Kyoto Protocol;
- (d) ensuring the timeliness, completeness, accuracy, consistency, comparability and transparency of reporting by the Community and its Member States to the UNFCCC Secretariat.

In particular article 3.2 reports that for the assessment of projected progress Member States shall report to the Commission, by 15 March 2005 and every two years thereafter:

- (a) information on national policies and measures which limit and/or reduce greenhouse gas emissions by sources or enhance removals by sinks, presented on a sectoral basis for each greenhouse gas;
- (b) national projections of greenhouse gas emissions by sources and their removal by sinks as a minimum for the years 2015, 2020, 2025 and 2030, organized by gas and by sector;
- (c) information on measures being taken or planned for the implementation of relevant Community legislation and policies, and information on legal and institutional steps to prepare to implement commitments under the Kyoto Protocol and information on arrangements for, and national implementation of, compliance and enforcement procedures;
- (d) information on institutional and financial arrangements and decision making procedures to coordinate and support activities related to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, including the participation of legal entities.

In accordance with article 3.2, this report contains the following items:

1. Description of policies and measures that are implemented, adopted and planned.
2. Projections of future emissions divided into two scenarios:
 - WEM (with existing measures) national base scenario that includes all measures implemented or adopted;
 - WAM (with additional measures), that includes planned measures
3. Implementation of Community legislation, institutional and financial arrangements

The structure and content of the report follow the Implementing Provisions adopted under 280/2004/EC (Commission Decision 2005/166/EC) and the UNFCCC reporting guidelines (FCCC/CP/1999/7).

2 Policies and measures

2.1 Introduction

This chapter describes policies and measures which have had, or are expected to have, a large impact on greenhouse gas emissions in Italy. In the chapter are included EU, national and local policies. The policies and measures assessed are the ones reported in official MATTM documentation by the end of 2012.

The chapter summarizes policies in three sections:

- Cross-cutting policies
- ETS- sector
- Non ETS- sector (Civil, transport, industry, agriculture, waste and LULUCF)

Each section describes groups of policies and measures organized by greenhouse gas; only the most important ones are described in detail. The detailed list of measures is reported in Annex 1.

Each section closes with a summary table showing the effects realized in the sectors in terms of avoided emissions. In some cases, policies and measures are presented in an aggregated form; in the analyses performed at a high level of aggregation it is often neither possible or meaningful to separate out the impacts of individual instruments and programs which aim at the same emission source or activity.

Italy is committed to reduce its greenhouse gas emissions by 6.5% below base-year (1990) levels over the first commitment period (2008-2012) under the Kyoto Protocol and to reduce non ETS sector emissions of 13% by 2020 with respect to 2005 level under 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 (the so-called "Effort Sharing Decision" ESD).

An updated national strategy to meet the Kyoto Protocol and ESD targets has been approved by the Interministerial Committee for Economic Planning (CIPE) the 8th of march 2013. The resolution provides a list of measures and in particular identifies in Annex 2 the planned ones that should be put in place by Italy to achieve the compliances with the 2020 targets.

Moreover the 8th march 2013 the Ministry of Economic Development, Infrastructures and Transport and the Ministry of Environment, Land and Sea have approved by a decree the new "National Energy Strategy". This strategy identifies a path to achieve the target of the Climate Energy Package and contains a list of measures that will be implemented. The measures are the same that are reported in the CIPE 2013 resolution and listed in template submitted in march 2013.

2.2 Cross Sectoral Policies

The cross – sectoral policies are applied to more than one sector.

2.2.1 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. Such Directive sets individual targets for each Member State (the national target for Italy is 17%) . EU countries are free to decide their own preferred 'mix' of renewables, allowing them to take account of their different potentials. They must present national action plans (NAPs) based on the indicative trajectories to the European Commission by 30 June 2010, followed by progress reports submitted every two years. The objective expressed in the form of a share of energy from renewable sources relative to total consumption in transport, electricity and heating and cooling in 2020 takes also 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, both described below.

2.2.2 Conto termico

The “Conto Termico “ is the 28th December 2012 decree that implement the incentive scheme introduced by Legislative Decree 28/2011; in particular encourages small-scale energy efficiency measures and the production of thermal energy from renewable sources.

The measures under decree are building shells, replacement of heating plants with ones more efficient and replacement or installation of equipment using renewable energy.

The incentives are identified based on the energy saving achievable for the building and on energy production from renewable sources

2.2.3 The White Certificates system

The White Certificates or Title of Energy Efficiency (TEE) system represents a cross cutting policy aimed at promoting energy efficiency and delivering emissions reductions in all the energy end use sectors: industrial, residential, service. The system was firstly introduced in July 2001 by means of two ministerial decrees, later repealed and substituted by two new decrees approved in April 2004. Those decrees set the

obligation on electricity and gas distributors to achieve the primary energy saving target of 2.9 Mt of oil equivalent per year by 2009.

The Decree of the Ministry for the economic development of 21 December 2007¹ set the new targets for the years 2008 and 2009 and the prolonging of system at 2012 according to the following table:

Table 1 - National target for primary energy savings

REVISED TARGET FOR THE ITALIAN WHITE CERTIFICATE SYSTEM 2005-2012 (Mtoe/Year)		
Year	Electricity distributors	Gas distributors
2005	0.1	0.1
2006	0.2	0.2
2007	0.4	0.4
2008	1.2	1
2009	1.8	1.4
2010	2.4	1.9
2011	3.1	2.2
2012	3.5	2.5

Each gas/electricity distributor gets its own target on the basis of its national market quota. The annual energy saving targets can be achieved through the implementation of energy saving projects in all energy end-use sectors. Projects contribute to the achievement of targets for 5 years; only for specific projects (buildings thermal envelope, bioclimatic design, reduction of cooling needs, etc) the time limit is raised up to 8 years. Projects can be implemented either by distributors - directly or through controlled companies - or by energy saving companies (E.S.Co.). Target-bound distributors can therefore gain their own certificates, or buy them on the market from other parties. Certificates can be traded bilaterally or else through an organized market. Each Certificate testifies the saving of 1 t of oil equivalent

In the December 2012 was issued the so called “White Certificate Decree” concerning the determination of national quantitative targets of energy savings that must be pursued to the distribution companies for electricity and gas for the years 2013 and 2016, and for the expansion of white certificates mechanism. The decree also defines the criteria, the conditions and the procedures to implement energy efficiency measures in end-use energy and transfers to the GSE from 2013 the management, assessment and certification of energy saving projects carried out under white certificates.

¹ Decree of the Ministry of Economic Development of 21 December 2007, on "Revision and updating of the decrees of 20th July 2004 concerning the increase in energy end-use energy efficiency, energy conservation and developing renewable sources, G.U. n 300 of 28th December 2007.

Table 2 - National target for primary energy savings

REVISED TARGET FOR THE ITALIAN WHITE CERTIFICATE SYSTEM 2013-2016 (Mtoe/Year)		
Year	Electricity distributors	Gas distributors
2013	3.03	2.48
2014	3.71	3.04
2015	4.26	3.49
2016	5.23	4.28

The certification of the energy savings produced by each project is made via the issuing of Energy Efficiency Titles (EETs). 1EET is equivalent of 1 Mtoe

From the beginning of the mechanism to the 31st May 2012, the emission of 14,769,053 TEE was approved, 3,324,737 TEE only from the 1st January 2012 to the 31st May 2012.

The eligible projects are: rephasing 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.

A further extension of the white certificate system objective till 2020 is foreseeable, so it has been considered as a planned measure.

2.2.4 Fondo Rotativo Kyoto

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, the sustainable forest management and the promotion of innovative technologies in the energy sector.

A dedicated agency (instituted within ENEA) will deliver part of the necessary capital expenses, using an initial grant from the Government, needed for innovative technologies. The cost will be reimbursed by the operator and reused in other projects.

2.2.5 Directive 2012/27/EC – Energy Efficiency

The Directive 2012/27/UE establishes a common framework for the promotion of energy efficiency, doesn't set mandatory targets but in the same time shows measures in the areas of energy-supply and energy end-use.

Each member state by the end of April 2013 should set targets in terms of energy consumption and primary /final energy savings, energy intensity and should notify it to the European Commission. By the end of June 2014 the European Commission assesses progress.

The most important articles are ones related to the renovation of the buildings in the public sector, the metering and accounting of energy efficiency, promoting of heating and cooling (the impact on thermal generation), processing , transmission and distribution of energy.

2.2.6 Revision of energy taxation

The CIPE resolution of March 2013 plan a revision of the existing energy taxation of fuels used in industry, civil and transport sectors to support the use of low carbon fuels. The excise duty revision should not change the total tax burden for final consumers .

2.3 Sectors under the Emissions Trading Scheme (EU ETS)

Under the EU ETS, established by Directive 2003/87/CE, Italy was allowed to allocate 201,6 Mt of allowances for the period 2008-2012. The Allocation Decision was approved by the National Competent Authority on 20th February 2008.

The Directive 2003/87/EC has been recently amended by the Directive 2008/101/CE of 19 November 2008 in order to include the aviation sector and by Directive 2009/29/CE of 23 April 2009 that introduces substantive changes in the scheme. The most important one relates to the cap-setting procedure, where the new system will be no longer based on national-cap setting but on a EU single wide cap to be allocated to each operator on the basis of benchmarks.

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 for the period 2008-12. This path set implies a decrease of the EU wide cap of 1.74% annually. Among the other significant changes it has to be underlined a more significant role of auctioning as method for allocation, the extension of the trading period from 5 to 8 years the inclusion of some other activities such as the production of nitric, adipic glyoxal and glyoxylic acid, the production of ammonia, aluminum and some other greenhouse gases (nitrous oxide and perfluorocarbons).

Table 3 below shows emissions projection for ETS sectors in the second trading period (2008-2012) and the difference between the emissions projections and allocation.

For the third trading period (2013-2020) no disaggregation of the objective at Members' State Level is foreseen. 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.

Table 3 - Emissions projections and allocations for ETS sectors

	2008	2009	2010	2011	2012
	Mt CO ₂	Mt CO ₂	Mt CO ₂	Mt CO ₂	Mt CO ₂
Emission projections (WEM scenario)	220.7	184.9	191.5	189.7	180.1
Allocation (*)	201.6	201.6	201.6	201.6	201.6
Difference between emissions projections and allocation	19.1	-16.7	-10.1	-11.9	-21.5
Allowed use of CERs/ERUs	30.2	30.2	30.2	30.2	30.2

- The table reports the average allocation for the commitment period, the annual allocation change from year to year.

2.4 Energy Production and transformation Sector

The Energy production and transformation sector is under Emission Trading Scheme and the CO₂ policies relating to the energy sector have traditionally fallen into four main measures:

1. Use of renewable energy
2. Cogeneration
3. Improving the efficiency of electric power plants
4. Improving of energy efficiency in industry

2.4.1 Renewable energy

In Italy the electricity production by renewable use have had a very important development in the period 2010-2012, driven by the incentives, in particular for the photovoltaic sources; in fact the electricity gross production from renewable sources was ~ 93 TWh in the 2012 compared with a 2020 target of 100 TWh. As explain before this rapid growth is due in particular to the high incentives for photovoltaic production that haven't closely followed the cost reductions of this technology. Photovoltaic generation has reduced capital costs of about 70% from 2008 to 2012. The Legislative decree 28/2011 and the "Conto termico" have brought very important changes in the incentives scheme for photovoltaic, the most relevant being:

1. Incentives are reduced, bringing them closer to European levels (even if they remain higher than the other countries), with a gradual shift to the competitiveness "grid parity";
2. the technologies with the greatest impact on the country's economic sector and a higher content of innovation are preferred;

The approach described above should allow a gradual and orderly growth of the sector with the possibility to achieve of production of 120-130 TWh / year according to 2013 "National Energy Strategy". This forecast is based on :

- a) the realization of the planned capacity in the two ministerial decrees of 2012,
- b) on the hypothesis of newly installed capacity for PV grid parity, now estimated at up to 1 GW / year,
- c) on a 'substitution effect 'for other renewable technologies, which can grow without generating the levy annual tariff increases (indeed, allowing a reduction), mainly thanks to the outputs of the old plants from the previous incentive mechanisms more expensive.

Also the thermal renewable sources have an relevant role to achieve the climate-energy package targets. Until now these technologies have been rather neglected by the country's energy policies and regulation, but despite this, they have had a important development.

The heat consumption represents the largest share of our energy consumption, both in the civil and industrial (approximately 45% of total final consumption). The thermal renewable are generally more efficient and less expensive than the electric ones, in terms of cost per tonne of CO₂ avoided or cost per kWh of final energy produced and

involve significant benefits of saving fuel for the final consumer (eg through biomass heating), and for the country as a whole (reduced imports of fossil fuels).

The development of renewable thermal energy over the past five years has occurred in line with the objectives of the National Action Plan (5.4 Mtoe in 2010) and has driven by measures were regarding energy efficiency, tax deductions or white certificates.

The strategy of development of thermal renewable energy is based on a number of specific mechanisms:

For small size technologies (relating primarily to the civilian sector), the Government has recently launched a ministerial decree the so-called "Conto Termico". This mechanism, as explained before, provide the access to the incentive scheme to the most virtuous technologies, with a minimum established for each type of technologies and greater incentives where there is also energy efficiency.

Regarding larger technologies the supporting mechanisms are the White Certificates.

Policy instruments currently that were used before and are reported in the WEM scenario are Green Certificate and the Conto Energia a brief description is reported below.

2.4.1.1 The Green Certificates system

Since the early 90s several different schemes have been introduced to subsidise the diffusion of renewable energy sources in electricity production. A feed in tariffs system was adopted in 1992 (Cip 6), but its high costs and unsatisfactory results suggested the suspension in the numbers of the new plants qualifying for incentives. Under this decree, only those plants already operating or at least under construction at the time of its entry into force, could still be qualified for the CIP 6 incentives. A new incentive scheme, based on a market oriented mechanism, was later introduced with legislative decree 79/99.

The legislative decree 79/99 introduced the obligation on electricity providers (producers and importers) to feed the grid with a minimum share of electricity produced from renewable energy sources. The obligation started in 2002. The initial share was set at 2% of the overall electricity produced or imported (exceeding 100 GWh), but the increase of this quota over time was already planned in the decree. As reported in the subsequent paragraphs, the law provides for an indirect bonus for cogeneration: in order to calculate the required quantity of renewable electricity, the electricity produced by cogeneration plants is subtracted from the total.

Providers are allowed to fulfil their obligation by different means:

- they can generate the required share of renewable electricity setting up new renewable capacity;
- they can import the required share of renewable electricity from foreign countries where a similar mechanism is in force, or;
- They can purchase the relative quota, represented by the so called Green Certificates, on the market.

Green Certificates are tradable rights issued for the first eight years of incremental generation of renewable electricity: in order to qualify for the issuance of Green Certificates the plant generating renewable electricity must have started operation after April 1st, 1999. Each certificate represents 50 MWh and its price is determined by market forces. However, Green Certificates are still issued even to "Cip 6" plants

and they are attributed to the GSE². In case of insufficient supply of Green Certificates on the market, the GSE can sell these certificates at a prescribed price that is the difference between the take-up price paid to the generator and the average price paid in the same period to conventional producers. This price has become an upper boundary for the price of the certificates freely sold on the market.

Paragraph 5 of Article 22 of Legislative Decree 28/2011 declares the end of the incentive mechanism of green certificates after 2015, see also point 2.4.1.3 below.

2.4.1.2 The “Omnicomprendiva” Tariff

The “Omnicomprendiva” (all-encompassing) tariff is a support system based on providing fixed charge granted to renewable energy installations in the energy function electric grid (feed in tariff). This rate is applicable only to facilities power of less than 1 MW (200 kW for wind power) and includes both the incentive and the remuneration for the energy fed into the grid. The rate is all-encompassing differentiated by technology and is recognized for a variable period also depending by technology. This system will substitute all other incentives schemes for small installations.

2.4.1.3 Ministerial Decree of 6th July 2012

With the Ministerial Decree of 6th July 2012 the incentives for the renewable electrical energy (excluding photovoltaic) has been changed, in particular starting from the 1st January 2013 the “Green Certificates” and the “Omni Comprendiva Tariff” have been replaced by a new scheme, less expensive for the end users, people and company. The main changes introduced by the decree concerning the way of access to incentives, that according with the new scheme are divided into three parts depending on type and power of plants:

- Direct access to incentives: for new or fully reconstructed or restarted plants below a threshold level;
- Register enrollment : for new or fully reconstructed or restarted plants that have power bigger than the Direct access level but lesser than the auction level;
- Auction: for new or fully reconstructed or restarted plants with power bigger than a certain threshold value.

In the following table are reported the threshold for the access to the different incentives divided by type of renewable energy sources:

Table 4 – Ministerial Decree of 6th July 2012 - Incentives scheme

Source	Direct access	Register	Auction
Wind - on shore	1-≤60kW	>60kW-≤5MW	>5MW
Wind - offshore	1-≤60kW		>5W
Hydroelectric	1-≤50kW	>50kW-≤10MW	>10MW
Hydroelectric (art.4, c. 3, b)	1-≤250kW	>250kW- ≤10MW	>10MW
Oceanica	1-≤60kW	>60kW-≤5MW	

² Gestore dei Servizi Elettrici S.p.A.

Source	Direct access	Register	Auction
Geothermal	1kW-≤20MW		>20MW
Geothermal (art.4, c. 3, f)	1kW-≤5MW		
Biomass (art.8,c. 4, a) e b)	1-≤200kW	>200kW-≤5MW	>5MW
Biomass (art.8, c. 4, c) e d) from waste water treatment sludge, biogas and bioliquid		1kW- ≤5MW	>5MW
Biogas	1-≤100kW	>100kW-≤5MW	>5MW

Source: FIRE – Federazione Italiana per l’uso Razionale dell’Energia

2.4.1.4 The “Conto Energia”

The “Conto Energia” is a support system that provides constant compensation 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).

In the Table 5 are reported impacts for every single measures.

Table 5 – Summary of policies and measures in the energy sector – Renewable energy sources

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
WEM SCENARIO –Implemented Measures			
Third "Conto Energia" (art.3 paragraph 1, decree 6 august 2010) and Fourth "Conto Energia" (Decree 5 may 2011)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 8000 MW	2.3	2.3
Third "Conto Energia" : photovoltaic (art.3 paragraph 2, decree 6 august 2010)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 3000 MW	0.90	0.90
Green Certificate - budget law 2008	Green Certificate increased every year by 0,75% for 2007 - 2012 and establish "omnicomprensiva" rate for plants <1 Mwe	4.00	4.00
European regional development fund (ERDF), National Strategic Framework 2008-2013	Supporting system for RES whit Regional operative program (POR) and Interregional operative program (POIN)	1.40	1.40
WAM SCENARIO –Planned Measures			
National Action Plan for Renewable Energy 2010	Measures under the NAP - RES 2010 reducing energy losses through the modernization of the national electricity transmission grid and of the distribution grid	0.00	0.99

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
National Action Plan for Renewable Energy 2010 - Legislative decree 28/2001 - Kyoto fund	Measures to achieve the 2020 target provided by the NAP 2010 and further incentives for the implementation of the Decree. 28/2011 to reach the 110 TWh target from renewable sources, including the development of smart grid. Supporting small interventions for renewable energy with capital loans at subsidized interest rate.	0.80	6.32
New measure of promoting and supporting RES-E	Measures to be determined after the achievement of 130 TWh renewable electricity target, as indicated in the "National Energy Strategy" report	3.50	10.00
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011	Measures for the promotion of thermal energy from renewable sources and incentives to small-scale interventions to increase the production of thermal energy from renewable sources	0.00	10.60

Source: CIPE 8th march 2013

2.4.2 Cogeneration

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 RES cogeneration plants are additionally entitled to receive Green Certificates to reward the green electricity produced.

The main benefits currently granted to co-generation are:

- legislative decree 79/99: dispatch priority; exemption from the obligation to purchase Green Certificates and right to obtain Green Certificates for those cogeneration plants using geothermal energy or firing/co-firing biomass;
- AEEG 34/05: incentive prices for the electricity produced by co-generation plants having a capacity of less than 10 MVA;
- legislative decree 504/99 and 26/07: tax reduction on natural gas utilized;
- legislative decree 20/07: right to obtain White Certificates for all cogeneration plants;
- ARG/elt 74/08: net metering for the electricity produced in high-efficiency cogeneration plants with a nominal capacity not over 200kW;
- law 99/2009: simplified authorization procedure and right to obtain Green Certificates to reward the thermal energy for cogeneration plants combined with district heating;
- law 192/05: obligation for new buildings and buildings subject to major renovation to lay down all the necessary works to allow the connection to district heating systems, when existing (and not further than 1 km) or planned.

These measures have been included in the WEM scenario. As implemented measures have been considered those included in the Action Plan for improving energy efficiency. This plan is designed to reach quantifiable targets till 2016.

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

In Table 6 are reported impacts of policies and measures modelled in the WEM scenario and a planned measures included in the WAM scenario.

Table 6 – Summary of policies and measures in the energy sector – Cogeneration

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
WEM SCENARIO – Implemented Measures			
White certificates - decree december 2007	Supporting CHP and district heating plants for 2008-2012	0.97	0.97
National Strategic Framework 2007-2013 - ERDF	Supporting CHP and energy savings with POR and POIN	0.24	0.24
WAM SCENARIO – Planned Measures			
National Action Plan for Energy Efficiency 2011 - 2006/32 Directive - Supporting of High efficiency CHP (09/05/2011 Law) with white certificates - Kyoto fund	Promotion of cogeneration and trigeneration	1.05	2.26
National Action Plan for Energy Efficiency 2011 - 2006/32 Directive - Supporting of High efficiency CHP (09/05/2011 Law) with white certificates 2012-2016 - Kyoto fund	Promotion of cogeneration and trigeneration	0.46	1.49

Sources : CIPE 8th march 2013

2.4.3 Energy efficiency of electric power plants

The liberalization of the electricity sector brought in by Legislative decree 79/99 started a deep refurbishment of the power generation sector. The decree had the main purpose of reducing the dominant position of Enel, the former state monopolist, by forcing it to sell part of its generation capacity to new entrants.

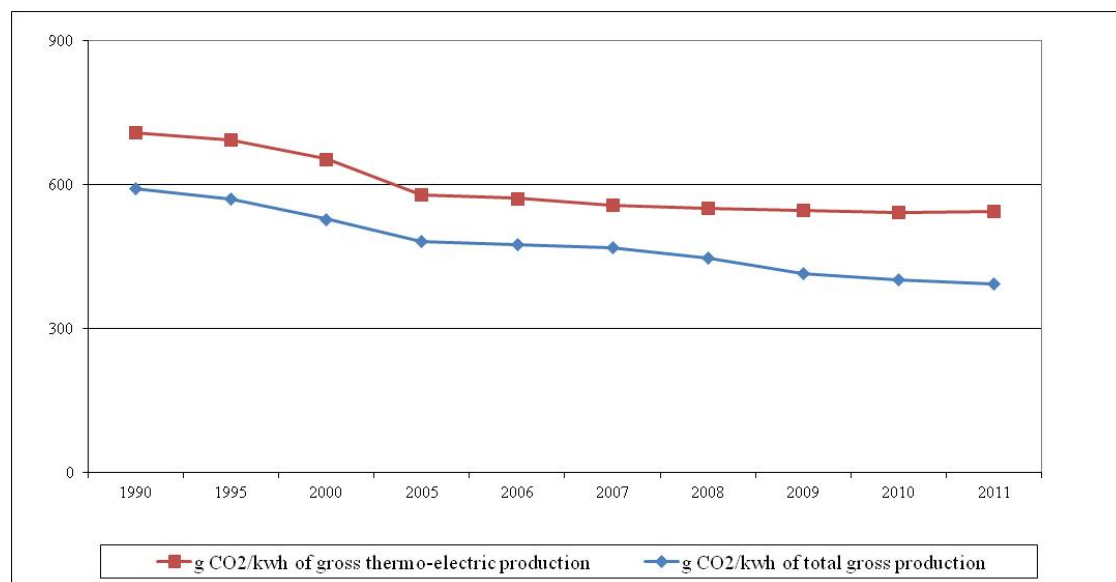
Subsequent Decree 4 August 1999 identified the plants that had to be sold to new entrants and specified those that had to be converted to from fuel oil steam plants to new combined cycle gas turbine plants (CCGT) using natural gas. This last provision was intended to increase the overall efficiency in power generation and to reduce CO₂ emissions of the energy supply sector. Out of a total capacity to be divested of 15,000 MW, 9,400 MW were forced to be converted to CCGT.

Law 55 of 9 April 2002 was introduced to simplify the authorization procedure for the construction and operation of power plants with a capacity of over 300 MW. From 2002 to the end of 2006 the Ministry of Economic Development issued 45 authorization for 21,400 MWe of new capacity; among these 23 authorizations, for an overall capacity of 9,897 MW, were issued according to the new procedure brought in by law 55/02.

Law 239 of 23 August 2004 introduced some important changes in the energy sector. One of its main purposes was to speed up the authorization process for the construction of new power plants and energy infrastructures, particularly grid lines. Since the entry into force of law 239/04, new energy infrastructures for approximately 2,300 MW have been developed and new CCGT plants for about 3,200 MW have been constructed, which led to consistent emissions reductions.

The short term effect of the implementation of these laws is already visible in the analysis of the historical data on electricity generation, while the “medium-long term” effect can be inferred by the analysis of the new power plants which are currently under construction and those entering into the production phase is scheduled for 2009. The overall effect of these substitutions has been a decline of the specific emissions of the electricity produced in thermoelectric plants which declined from 709 g/kWh in 1990 to 545 g/kWh in 2011.

Figure 1 - Emission factors of gross production



Source: ISPRA elaborations

The decline in the specific emissions, essentially due to an increase in the overall efficiency in the thermoelectric production and a decline in the carbon content of the

fuel used in the power plants, has contributed in limiting the increase of the emissions due to the increase of the overall thermoelectric production.

From 2000 to 2011 in Italy there was increased use of natural gas and a decrease of petroleum derived fuels use. Other energy sources are quite stable, see

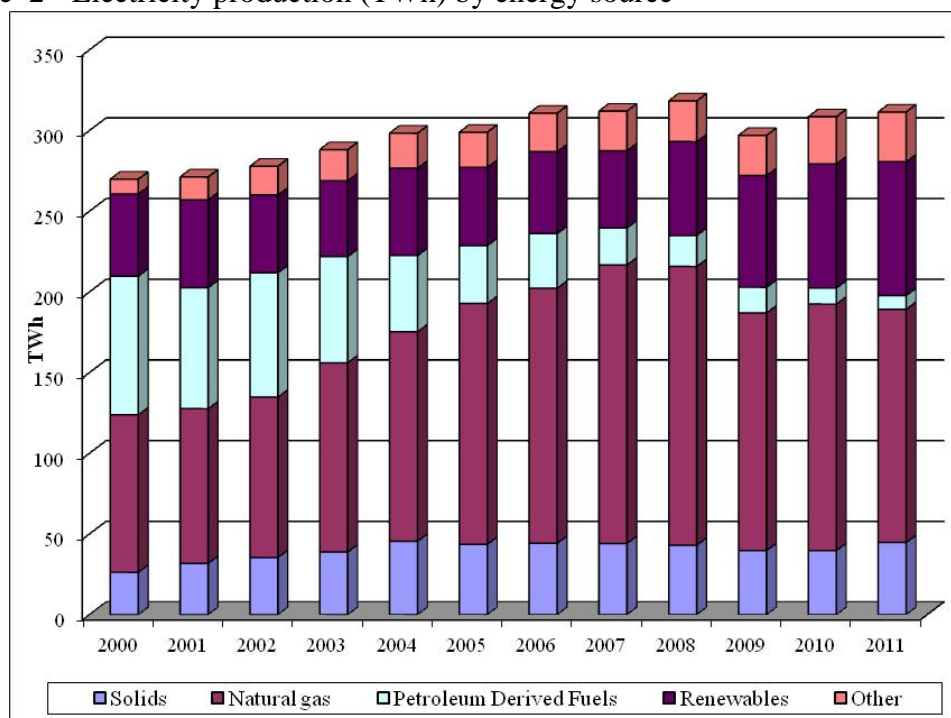
Figure 2.

Regarding the period after 2009, one sizeable (1800 MWe) new coal power plants has entered in service in 2010 (Civitavecchia) and another two are planned after 2015. Additionally older coal units will be substituted by smaller new units (400 MWe each) in three other sites. The new plants will substitute old coal / oil fired power plants. In the WEM scenario the emissions from the new plants are balanced with the phasing out of less efficient coal plants.

The striking increase in natural gas consumption requires the construction of new import infrastructure (two additional international pipelines are planned) and the construction of several new import terminals for LNG.

All measures are included in WEM scenario.

Figure 2 - Electricity production (TWh) by energy source



Source: ISPRA elaboration of TERNA data

2.4.4 Energy efficiency in industry

Policies affecting CO₂ emissions in the industry sector are generally designed to improve industrial energy intensity.

A 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 will impose new targets for White Certificates to 2016, and it is envisaged the extension of the scheme to 2020.

Another important initiative recently introduced by the Government concerns the replacement of existing inefficient electric motors with high efficient ones. This is a measure that can help achieve substantial CO₂ emissions reductions in the industry sector, but the engines high purchase price and the lack of information about their energy saving potential represent a main obstacle to their diffusion. The Budget laws 2007 and 2008 therefore provide for tax credits for high efficiency electric engines and inverters. The European regulations 640/2009 and 641/2009, related to Legislative decree 201/2007 (directive 2005/32/CE) imposed on *new electric motors and pumps minimum efficiency requirements with a gradual introduction between 2011 and 2017*.

Since the potential for energy saving in the industry sector is still consistent, several new additional measures are currently under discussion to try to exploit it.

Further measures will be introduced to implement directive 2006/32/CE on energy end use efficiency and energy services.

White certificated related to decree December 2007 have been considered also implemented policies instead white certificated related to new target of Action plan 2007 have been considered adopted policies.

Further extension of Action plan target to 2020 with White Certificate system have been considered as planned measures.

Table 7 - Summary of policies and measures in the industry sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
WEM SCENARIO – Implemented Measures			
White certificates - decree december 2007	Supporting electric energy saving for the period 2008-2012	2.02	2.02
Legislative decree 201/07 (trasposition of directive 2005/32/EC- first regulations)	Installation of highly efficient electric motors and inverters through minimum mandatory standards	0.54	1.92
European regional development fund (ERDF), National Strategic Framework 2008-2013	Supporting electric energy saving with POR and POIN	0.66	0.66
WAM SCENARIO – Planned Measures			
National Action Plan for Energy Efficiency 2011 - 2006/32 Directive - White certificates 2012 - 2016	Further extend of energy saving targets (White certificates 2016-2020)	1.31	3.50
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011 - White certificates 2016 - 2020	Promoting energy efficiency in implementing the actions foreseen in the NAP 2010 (efficient lighting systems, ICT systems, replacement of electric heating systems) for the period 2016-2020	0	3.58
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011 - White certificates 2016 - 2020	Further use up to 2020 of the white certificate system to promote measures of mechanical vapor compression, energy saving in the chemical industry, glass, paper and heat recovery in industrial energy intensive processes	0	3.90
Reformulation of energy taxation	Promoting the use of products and services with low carbon content also with measures of information	0	1.50
Legislative decree 28/2011	Promotion of energy saving	0.61	1.64

Sources : CIPE 8th march 2013

3 Sectors under the Effort Sharing Decision (ESD)

Under the ESD Decision (Decision No 406/2009/EC) Italy has to reduce emissions from sectors non covered by EU ETS of 13% compared to 2005 by 2020. The ESD establishes also annual binding reduction targets from 2013 until 2020. The 2020 target is calculated using the following formula:

$$(A-B-C-D-E)*(1+F)$$

where:

- A Total emissions excluding LULUCF in 2005
- B CO2 emissions from civil aviation in 2005
- C Verified 2005 emissions of installations covered by the ETS in 2005-2007
- D 2005 emissions of installations that were included (counted as positive) or excluded (counted as negative) in the ETS in 2008-2012 due to an adjusted scope applied by the Member State
- E Verified 2005 emissions of installations opted out in 2005 and included in the ETS in 2008-2012
- F Percentage stated in the ESD Annex II (for Italy –13%).

The 2013 target is calculated using the following formula:

$$\text{Average ESD emissions 2008-2010} = (A' - B' - C')$$

- A' Total emissions excluding LULUCF in 2008-2010
- B' Average CO2 emissions from category 1.A.3.a in 2008-2010
- C' Average verified emissions of installations covered by the ETS in 2008-2010

Annual emission allocation (AEA) is also assigned for the year "y" of the ESD commitment period 2013-2020 and the formula is reported below:

$$[AEA](y) = [Average ESD emissions 2008-2010] *(2020-y)/7 + [AEA](2020)*(y-2013)/7$$

- AEA : Annual Emissions Allocation
- Y: year

Decision CE (2013) 1708 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC was adopted as submitted to the European Parliament and Council for scrutiny after the approval 17 October 2012 of the Climate Change Committee. For Italy the target 2013-2020 are reported on the table below.

Table 8 – ESD 2013-2020 targets for Italy

				2013	2014	2015	2016	2017	2018	2019	2020
ITALY	ESD	Target	-(whit GWP 2 nd IPCC)	310.1	308.1	306.2	304.2	302.2	300.2	298.3	296.3
ITALY	ESD	Target	-(whit GWP 4th IPCC)	317.8	315.6	313.5	311.3	309.2	307.1	304.9	302.8

Sectors covered by the ESD are:

- Civil sector
- Transport
- Industrial processes
- Waste
- Agriculture

Policies and measures regarding these subsectors are described in the following paragraph.

3.1 Civil sector

The package of policies deployed in this sector aims at improving energy efficiency (for example by White Certificates) through specific actions targeted both at existing and new buildings and at appliances. Improving the energy efficiency of buildings and reducing the related emissions has become a priority in the last few years.

The implementation of directive 2002/91/CE was an opportunity to introduce stricter energy requirements and to promote the diffusion of renewable energy sources in the building sector. The Directive lays down requirements on the application of minimum standards for the energy performance of new buildings and on the performance of large existing buildings undergoing major renovation. The directive also requires the provision of energy performance certificates when buildings are constructed, sold or rented out. The legislative decree 192/2005 transposed the directive into national law but it required the adoption of further ministerial decrees to become fully operational. At the end of 2006, legislative decree 192/2005 was amended by legislative decree 311/2006 to strengthen the buildings thermal demand requirements. The new law applies to new buildings and to existing buildings subject to major renovation³ and provides for some important measures. Amongst the main provisions, the following obligations are worth citing:

- 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;

³

As regards the minimum energy performance requirements of existing buildings subject to major renovation, the decree applies only in case of large buildings of over 1000 m² and in case of expansion of existing buildings (over 20%). The decree applies only partially to existing buildings under the 1000m² threshold.

Dir. 2010/31/EC recasts the European Energy Performance of Buildings Directive (EPBD). This measure defines mandatory standards for new buildings with net zero energy. The transposition of this directive will raise the requirement on new buildings and in the same time will be important to strengthen the control system, making it consistent in all region.

The Budget laws 2007-2012 provide for fiscal incentives in the civil sector to implement energy efficiency project :

- tax incentive of up to 100.000 euros for owners and tenants of existing buildings who reduce energy use by at least 20% relative to the requirements provided for by legislative decree 192/05;
- tax incentive of up to 60.000 euros to improve the insulation of existing buildings;
- tax incentive of up to 60.000 euros to support the installation of solar thermal applications;
- tax incentive of up to 30.000 euros to replace the existing boilers with condensing boilers;
- tax incentive of up to 200 euros for any A+ refrigerator and freezer;
- tax incentive of 36% for the installation of energy saving lighting systems in non residential buildings;
- contribution of 55% of the extra costs incurred to reduce the energy consumption of new buildings (with a surface of over 10.000 cubic meters) of at least 50% relative to the requirements provided for by legislative decree 192/05.

There are also minimal efficiency requirements on new domestic appliances (TV, refrigerator, lamps, etc.) , with a gradual introduction between 2009 and 2015. Those standards take into account the European regulations 644/2009, 278/2009 242/2009 243/2009 and 1275/2008 and are put into practice by the Legislative decree 201/2007 (directive 2006/32/CE). The Decree 21 December 2007 included energy efficiency in the civil sector to comply the White Certificate system target to 2012.

The implementation of directive 2006/32/CE on energy end use efficiency and energy services in the civil sector and the Action Plan 2007 will impose new efficiency targets to the White Certificates system by 2016.

Consistent reductions are also expected from the introduction of other regulations for energy efficiency standards for new energy-consuming products introduced by law 201/2007 (transposition of directive 2005/32/CE).

With regard to the tax deduction (the so called 55%) Government would like to extend this measure over time. The purpose is to make this measure structural but actually it has been extended year by year due to the high cost of implementation and the budget restriction. Moreover in each extension the measure is partially revised according to available budget and updated list of technology addressed.

Part of these measures have been included in the WEM scenario, the other part have been considered as planned measures in the WAM scenario.

Table 9 - Summary of policies and measures in the civil (residential and tertiary) sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
WEM SCENARIO –Implemented Measures			
Building Regulation (Legislative decree 192/05 as amended by legislative decree 311/06)	Minimum mandatory standards on new and existing buildings (Energy Efficiency)	2.18	3.61
Budget law 2007 and budget law 2008	Supporting of energy saving in existing buildings through tax deduction of 55%	0.61	0.61
Budget law 2009	Supporting of energy saving in existing buildings through tax deduction of 55%	0.44	0.44
White certificates - decree december 2007	Supporting of energy saving 2008-2012 (Energy Efficiency)	3.12	3.12
Legislative decree 201/07 (trasposition of directive 2005/32/EC- first regulations)	First regulation on mandatory energy efficiency standards for energy-using products	0.87	2.60
National Strategic Framework 2007-2013 - ERDF	Supporting electric energy saving with POR and POIN	0.42	0.42
WAM SCENARIO –Planned Measures			
Legislative decree 28/2011	Promoting energy saving in the residential sector (public, domestic, tertiary): insulation, replacement windows and boilers, installation of heat pumps and solar thermal panels	1.76	4.69
National Action Plan for Energy Efficiency 2011 - White certificates 2012 - 2016	Promoting energy saving	0.8	1.23
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011 - White certificates 2016 - 2020	Promoting energy saving	0.00	2.53
Directive 2010/31/EC - New standards of efficiency in buildings	Further reduction of energy consumption in buildings and promotion of renewable energy in the building and incentive mechanism through the tax deduction	0.00	4.00
Budget law 2009 - Extending tax deduction of 55%	Energy saving in existing buildings	0.34	1.15
Reformulation of energy taxation	Promoting the use of low carbon products and services also with measures of information	0.00	1.00

Sources : CIPE 8th march 2013

3.2 Transport

The policies and measure considered in the transport sector are:

- Infrastructural measures regarding completion of high capacity and high speed networks and tuning of regional networks for commuting and goods.

Management measures regarding enhancement of road urban public transport network.

- Intermodal measures regarding shifting from private road traffic to public road traffic and shifting goods transport from the road to the sea and management measures regarding supporting efficiency in private road transport and improving road circulation in the urban areas have been considered adopted policies and measure.
- fleet update measures have been considered fleet update regarding further 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 requirement of the Directive 2009/28/EC : 10% of use of biofuel for transport at 2020.

The Budget laws 2007, following the European directive CE30/2003 prescribes that the minimum quota of bio fuel in 2009 is a 3% of total sold and 5,75% by 2010, recently the date has been moved to 2013.

Table 10 - Summary of policies and measures in the transport sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO ₂ eq.)	
		2015	2020
WEM SCENARIO –Implemented Measures			
Infrastructural measures	High Capacity and High Speed road. Regional networks for passengers and freight, subway	3.75	5.70
National Strategic Framework 2007-2013 - FESR	Intermodal infrastructure projects: metropolitan railways	5.40	10.20
Emission standard for new car (Regulation (EC) No 443/2009)	Fleet update at 120 g CO ₂ /km in 2015 and 95 g CO ₂ /km in 2020	0.32	1.28
Legislative decree 128/05(trasposition of directive 2003/30/EC)	Mandatory use biofuels (target 4.5% to 2012)	1.49	1.49
Directive 2009/28/EC	Mandatory use biofuels (target 10% to 2020)	0.59	1.58
WAM SCENARIO –Planned Measures			
Intermodal measures	National Action Plan for Renewable Energy 2010 - Infrastructures, intermodal and increasing of the electric public transport	1.17	3.50
Measures to improve the fleets update - Regulation (EC) No 443/2009	Reduce the average emissions Promoting the use of low carbon products and services also with measures of information	0.00	1.80
Reformulation of energy taxation		0	0.50

Sources : CIPE 8th march 2013

3.3 Industrial processes sectors

For the industrial processes sector has been taken into account the reduction of N₂O emissions in plants for the production of nitric acid. This measure can result in significant reductions in process emissions from the industrial sector, with a relatively small cost.

In the production of nitric acid, the most advanced technology is provided by SCR (Selective Catalytic Reduction) systems for the treatment of process gases with the adoption of the BAT-TALuft standard equal to (2.5 kgN₂O/tHNO₃). The measure could be applied to the main production plants in Italy. This process has been included in the emission trading scheme starting from 2012. Therefore, this measure has been included in the WEM scenario.

Table 11 – Summary of policies and measures in the industrial processes sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO ₂ eq.)	
		2015	2020
WEM SCENARIO –Implemented Measures			
Nitric acid	Reduction of N ₂ O emissions in nitric acid production plants	0.74	0.74

Source: ISPRA

3.4 Agriculture

In the agriculture sector two main policies are considered:

- Rationalisation in the use of fertilizers : emission reduction from the agricultural soil source is mainly related to the rationalisation in the use of fertilizers. In order to achieve the objective is essential to consider ongoing efforts to heighten awareness of the practise, the adoption of the code of agricultural practice, and the integrated production of agricultural holding and organic farming. On the other hand, the CAP⁴ reform process, since Agenda 2000 is characterized by a progressive reinforcement for integrating environmental objectives in the framework of market policy and rural development. By combining different recommendations, still additional measures with mitigation potential can be encouraged for reducing the use of fertilizers. The measure is in the WEM scenario;
- Recovery of biogas from animal storage system: electricity generation from animal waste has increased in Italy 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 16th March 1999, N° 79, and subsequent legislation. In future years, further intervention will be required 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 in new farms but also in major existing ones. Additional measures for

⁴ Common Agriculture Policy

the reduction of methane emission are concentrated in two animal categories: cattle and swine. Also this measure are in WEM scenario.

Table 12 – Summary of policies and measures in the agriculture sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
WEM SCENARIO – Measures Implemented			
Nitrogen fertilizer	Rationalization in the use of nitrogen fertilizer	0.79	0.79
Animal storage	Recovery of biogas from animal storage system	0.4	0.4

Source: ISPRA

3.5 Waste sector

Emission reduction in waste sector is mainly related the improvement of waste management regarding the composition of waste disposed into landfills. In fact, the Landfill European Directive 1999/31/EC has been transposed in national decree only in 2003 by the Legislative Decree 13 January 2003 n. 36 and applied to the Italian landfills since July 2005, but the effectiveness of the policies will be significant in the future. Moreover, a recent legislative decree (Legislative Decree 30 December 2008, n.208) shifts to December 2009 the end of the temporary condition regarding waste acceptance criteria, thus the composition of waste accepted in landfills is hardly changing and the amount of biodegradable waste disposed of into landfills is not complying with the target of landfill directive.

For the waste sector two measures are proposed:

- Compliance with separate collection targets and biodegradable waste disposed of into landfills:
 - fulfillment of the deadlines set for MSW separate collection;
 - fulfillment of the deadlines set for biodegradable waste sent to landfill.
- Only bio-stabilized waste disposed of into landfills: a further measure regard the pre-treatment of all the biodegradable wastes which will be disposed into 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 increase also the energy recovery from the biogas production.

Table 13 - Summary of policies and measures in the waste sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Mg CO2 eq.)	
		2015	2020
WEM SCENARIO – Measures Implemented			
Separate collection	Compliance with separate collection targets and reduction of biodegradable waste disposed into landfills	3.70	3.70

Source: ISPRA

4 Projections

4.1 Description of methodologies, models

The emission scenario has been elaborated by a joint working group composed by members of Ministry of Environment, Land and Sea, Ministry of Economic Development, ISPRA - Institute for Environmental Protection and Research, ENEA - Italian National Agency for New Technologies, Energy and the Sustainable Economic Development. In particular ENEA has developed a set of different energy scenarios for the National Energy Strategy and the so called “Scenario SEN” is the one that better represents the implementation of all the measure envisaged⁵. The emissions resulting from “Scenario SEN” have been reported in this submission as “WAM scenario”.

The scenarios of greenhouse gas emissions from the combustion of energy sources are elaborated by ISPRA with a model based on the well known Markal software⁶.

The model is a partial equilibrium model and represents the domestic energy system and its main emissions. It contains over 70 independent demand for energy services in four main sectors – agriculture, industry, transport, commercial and household – split by sub sectors, type of service and material. Emissions of CO₂ are directly accounted for in the model using IPCC “reference approach” methodology and national Emission Factors.

The model follows a bottom-up technological approach: start from a single sector, or sub-sector, and identify the derivative aggregate data. This approach yields greater accuracy and details compared to the top-down approach, where sector variables are derived from a macro-variable (ex. income). The model is also “integrated” in the sense all economic sectors are represented and it “produces” and “distributes” the electricity and the fuels that are needed for final consumption, starting from primary sources. This approach avoids in principle the so called “double counting” of effects of the implementation of policies.

Structure and data of the full model, including the very detailed parts on end use devices that satisfy the 70 demands for energy services are summarized in [Contaldi, Gracceva, 2004].

4.2 Description of scenarios

The main assumptions in the scenario are:

- For the GDP is assumed a economic growth from 2014 with an average rate of +1.1% up to 2020, in line with the value reported for Italy in the EC - Commission report “The Ageing Report 2012”;
- Volumes and energy mix: reduce energy consumption and evolution of the mix towards renewable sources;
- Costs and energy prices: cost reduction and compliance of energy prices to the European levels;

⁵ For more details see paragraph 3.2 of National Energy Strategy

⁶ Markal (MARKet ALlocation) has been developed by the Implementing agreement of the International Energy Agency for a programme of Energy Technology System Analysis (IEA/ETSAP). The “Second Assessment Report” of IPCC (IPCC, 1995) suggest using Markal models to evaluate impact of mitigation policies. Source code is open, regularly maintained and documented.

- Population: The population has growth significantly from 2005 to 2010, due to immigration. It is estimated to further increase up to 2015 considering the input of immigrants, however is considered to stay more or less stable thereafter and up to 2030. The last Census by National Statistical Institute, published at the end of 2012 and not considered in the projections, has pointed out that population has gone down to about 59,600 in year 2011.

Table 14 - Population

	2005	2010	2015	2020
2007 Template submission / IV NC	58462	58,531	58,471	58,123
2009 Template submission / V NC	58,462	60,190	61,130	61160
2011 Template submission	58,457	60,464	61,130	61160
2013 Template / Actual developments	58,462	60,340	61,138	61,634

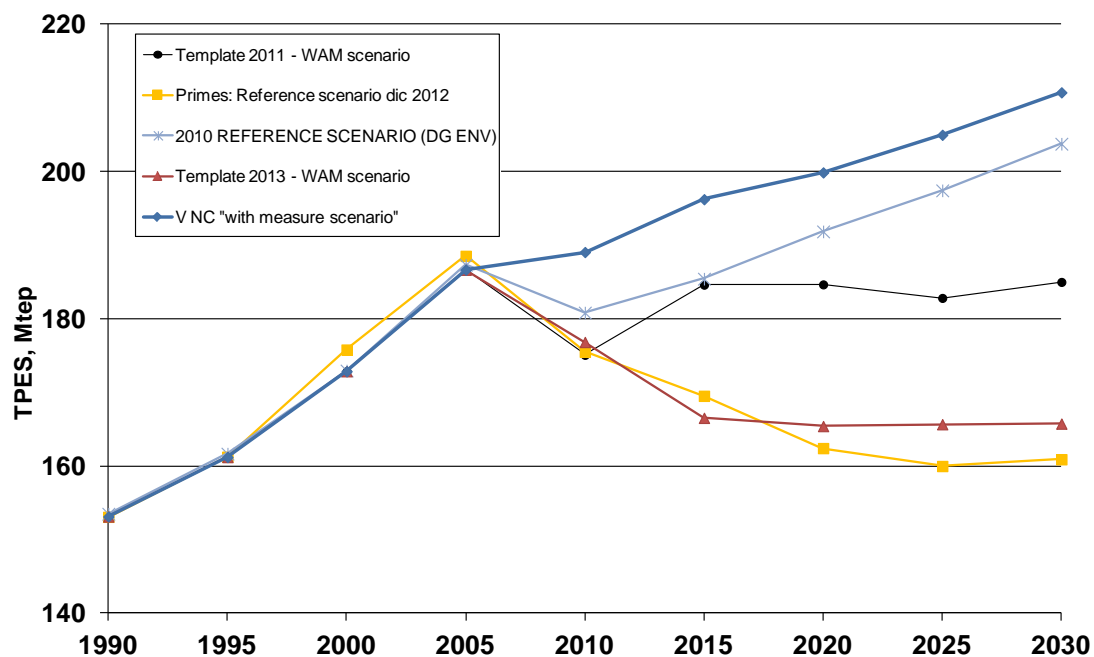
2.4.5 Consumption of primary energy

The total primary energy supply (TPES) in 2020, estimated according to Eurostat methodology, will be about 184 Mtoe, with an average yearly growth rate of 0.7% . The average growth rate in 2000-2008 was 0.6%, a decrease of 7% was observed between 2008 and 2009, followed by an increase of 4% in 2010 and stability in 2011. In 2020 the total primary energy consumption should be similar to 2009 level. The weight of natural gas will exceed the oil one around year 2015.

With reference to Figure 3 there are relevant changes in the estimated total energy consumption between the updated energy scenario from SEN (reported hereinafter in the figures as “Template 2013 – WAM scenario”) and the previous ones, identified as “V NC” , and “Tempate 2011 – WAM scenario” , due to the ongoing economic crisis.. The results are similar to the preliminary elaborations of Primes model, distributed in January 2013⁷.

⁷ 2012 Primes model reference scenario

Figure 3 - Projection of gross inland consumption, Mtoe



Note: energy consumption estimated according to Eurostat methodology

4.3 Emissions of greenhouse gases

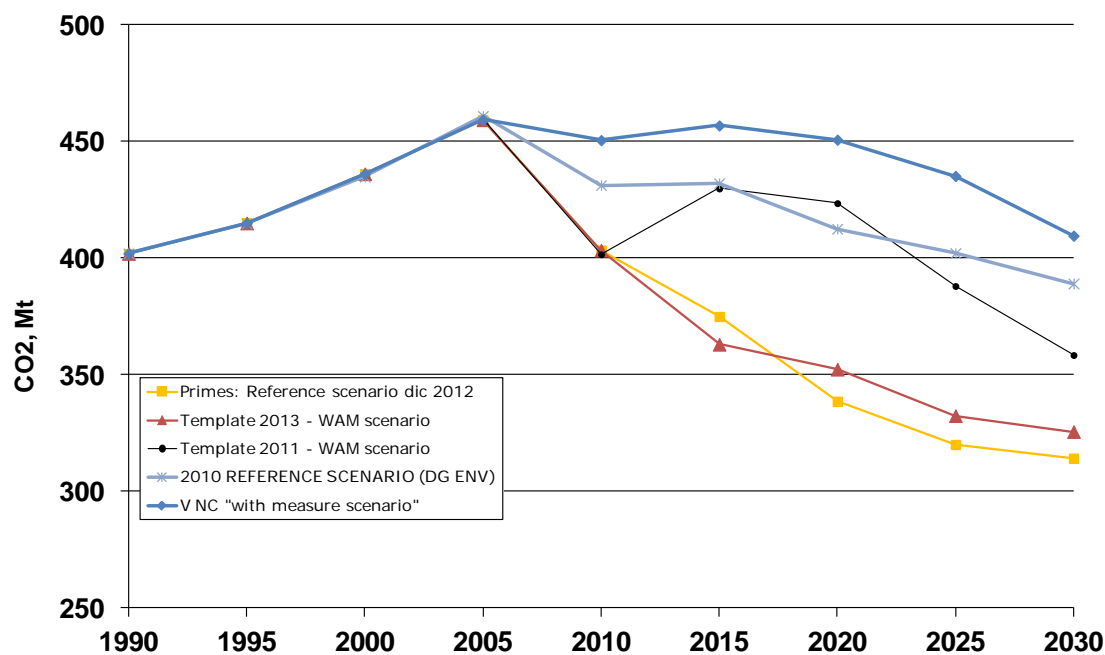
2.4.6 Energy CO₂ emissions

Based on above mentioned scenarios the model computes directly the CO₂ emissions from energy use, while other GHGs and non energy GHG emissions are estimated on the basis of estimated evolution of activity data and average emission factors. Emissions up to 2011 are final data, 2012 is preliminary., 2015 - 2020 are a model estimates.

As can be seen in the Figure 4 final results shows a remarkable reduction in emissions in 2010, and then a further decrease. 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 renewables in TPES, due to anticipated development of photovoltaic production and diffusion of biomass for heating;
- increased efficiency of electricity generation, with the entry in service of many combined cycle plants
- the reduced fuel consumption in transportation due to high fuel prices and low activity levels
- the sharp reduction of energy consumption in industrial sector due to crisis and structural changes in production.
- increase in efficiency of final end use devices, also due to high electricity prices.

Figure 4 - Actual and projected CO₂ emissions from energy sector, Mt CO₂



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

With reference to the detailed data in tabular format reported in Annex 5, it is possible a sector by sector analysis for the period 2010 -2020 . It shows that:

- the slight increase is in the energy industries emissions, 2010 – 2020 +5.1% in the WEM scenario change to a reduction of 20% in WAM scenario; in historical years, 2000 – 2010 +6.6%; in this sector the emissions growth is directly linked to the increase in fossil fuels based electricity production, that outpaced the efficiency improvements in historical years; in projection years only a limited further increase in thermoelectric efficiency is expected, electricity import should be reduced and renewable production is limited in WEM scenario.; In WAM scenario the planned expansion of renewable production , the stability of electricity consumption, and a reduction refineries activity due to the increase efficiency of vehicles will reduce the emissions ;. A further slight reduction is expected between 2020 and 2030 in WAM scenario, due to the increase of electricity consumption and thermoelectric production, all other factors being stable
- in the transport sector already in WEM scenario a reduction of 3.6% is foreseen,, 2010 – 2020 ; in historical years, 2000 – 2010 there has been a decrease in emissions of -4.1%, but a huge increase was registered from 1990 to 2000; in WAM scenario the decrease in emissions from 2010 to 2020 is higher, -14%: this result is linked to a reduced road demand growth (moved to other modes) and to the effect of national reinforce of the ongoing policies to increase efficiency of cars (EU regulation on cars CO₂) and further expansion of natural gas use. Between 2020 and 2030 the emissions are stable in WAM scenario because of the increase in activity that will balance the further efficiency improvements.
- civil sector, was increasing in historical years, 2000 – 2010 +13.5% and is projected a slight reduction in projection years WEM scenario 2010 – 2020 - 3.3% ; the emissions increases in the past are mainly liked to the expansion of the services sector and the expansion of residential building stock (second and third

houses) increased house size and higher internal temperature play an important role and, finally, to the rather cold weather in 2010; in projection years planned policies have a significant effect and are successful in curbing emissions; in WAM scenario reduction of emissions between 2010 and 2020 increase up to -13.6% due to higher efficiencies planned for building stocks and expansion of renewable use (biomass and geothermal). Climate is kept constant in the period. A further reduction of 13% is foreseen between 2020 and 2030 (WAM scenario) due to further improvements in building thermal isolation and expansion of geothermal heating. Climate data are kept constant in the model.

- industry emissions register a deep decrease in historical years, 2000 – 2010, -30%, the past trend include the effect of economic crisis; the emissions are planned to increase, +20%, between 2010 and 2020 in WEM scenario. Increase of activity data, or better a partial recovery of the activity data registered between 2005-2008 is the main driving force. In the WAM scenario the increase is almost halved, +11.2% between 2010 and 2020. The reduced increase is due mainly to increase in efficiency and cogeneration use. Emissions should stay almost constant up to 2030 due to a slight expansion in activity balanced by increase in efficiency.

Methodologically speaking we underline that the emissions computed by the model do not match 100% with the inventory estimate for the base modeling year, currently 2010, because of the unavoidable simplifications in the modeling of the energy system. The discrepancies are reduced to 1-2% in total and up to 4% in the single sectors. Those estimates are in any case the best available for projections of the emissions.

2.4.7 Other GHG emissions

In figure 5 the emissions of CO₂ from non energy sector and of GHGs from energy and non energy sector is reported. As can be seen there is a sharp emissions reduction between 2005 and 2010, The reduction is due to the effect of, in the following in order of importance:

- implementation on N₂O 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 emission due to a reduction of related industrial production
- increase recovery of animal wastes for biogas production and reduced/modified fertilizer use

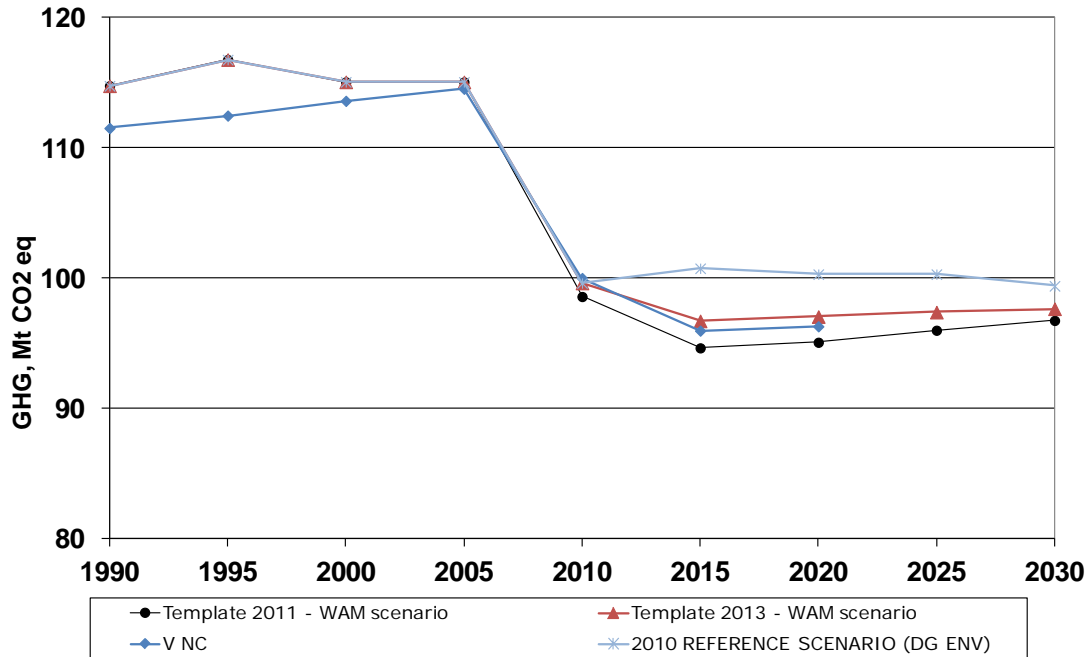
According to the scenario the emission are projected to further reduce from 2010 up to 2015 and then stay stable. The overall trend represent the combination of different evolution of underlining sectors and gasses, in particular:

- a stable trend in emissions for solvent, agriculture and waste sectors
- an increase in industrial process emissions
- a sizeable reduction of emissions of greenhouse gasses other than CO₂ from energy use of fossil fuels between 2010 and 2015, due to technology improvements.

Additionally we underline that there are no differences between WEM and WAM scenario emissions in Industrial processes, Solvent, Agriculture and Waste sector

because no additional measures are actually planned in those sectors. The increase in emissions in industrial processes is connected to a sizeable increase in use of substitute of ozone depleting substances and for a lesser part to an increase of industrial production. For all other sectors the emissions are stable or continue to slightly decline. Between 2020 and 2030 we observe a similar evolution.

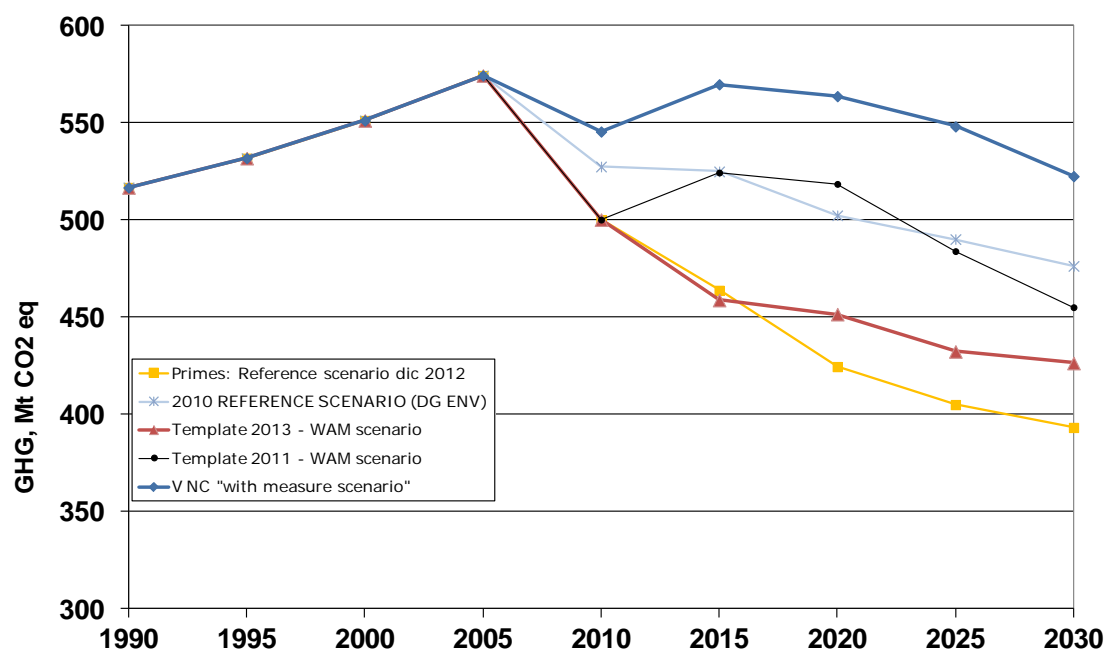
Figure 5 - Actual and projected net GHG emissions , Mt CO₂ eq



2.4.8 Total emissions of greenhouse gases

The resulting trend in total GHG emissions is reported in the Figure 6. Results from national scenario are compared with the results of Primes model output and previous national scenario. As can be seen the trend is consistently lower for various reasons, explained in detail in the previous paragraph

Figure 6 - Actual and projected GHG emissions , Mt CO₂ eq



4.4 LULUCF

LULUCF sector is actually excluded from ESD and other EU agreements. For the sake of completeness we report here also a brief description of this sector in Italy, according to UNFCCC agreements.

2.4.9 Definition of forest and national circumstances

Forest is defined by Italy under the Kyoto Protocol reporting using the same definition applied by the Food and Agriculture Organization of the United Nations for its Global Forest Resource assessment (FAO FRA 2000). This definition is consistent with definition given in Decision 16/CMP.1. Forest is a land with following threshold values for tree crown cover, land area and tree height:

- a. a minimum area of land of 0.5 hectares;
- b. tree crown cover of 10 per cent;
- c. minimum tree height of 5 meters.

Forest roads, cleared tracts, firebreaks and other open areas within the forest as well as protected forest areas are included in forest. Plantations, mainly poplars, characterized by short rotation coppice system and used for energy crops, are not included under KP-LULUCF activities, as they do not fulfill national forest definition while other plantation typologies, as chestnut and cork oak, have been included in forest and therefore included under KP-LULUCF activities.

Total forest area, in 2011, was equal to 9,073 kha, 30% ca of national territory. It has to be noted a steady increase since the 70's, with a rate of about 77kha per year, in the period 1985-2011.

Concerning the ownership, the following table shows the amount of public and private forest land.

Table 15 - Amount of public and private forest land

<u>FRA 2010 Categories⁸</u>	<u>Forest area (1000 hectares)</u>			
	<u>1990</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
Public ownership	2,549	2,811	2,942	3,073
Private ownership	5,041	5,558	5,817	6,076
...of which owned by individuals	4,442	4,898	5,126	5,355
...of which owned by private business entities and institutions	599	660	691	721
...of which owned by local communities	0	0	0	0
...of which owned by indigenous / tribal communities	0	0	0	0
Other types of ownership	0	0	0	0
TOTAL	7,590	8,369	8,759	9,149

2.4.10 Elected activities under Article 3 of the Kyoto Protocol

Italy has chosen to elect Forest Management (FM) as an activity under Article 3.4. In accordance with the Annex to Decision 16/CMP.1, credits from Forest Management are capped in the first commitment period. Following the Decision 8/CMP.2, the cap is equal to 2.78 Mt C (10.19 MtCO₂) per year, or to 13.9 Mt C (50.97 MtCO₂) for the whole commitment period.

Afforestation and reforestation areas have been estimated on the basis of data of the two last Italian National Forest Inventories (IFN1985 and IFNC2005). Deforestation data have been derived from administrative records at NUT2 level collected by the National Institute of Statistics.

The definition of forest management is interpreted in using the broader approach as described in the GPG LULUCF 2003. All forests fulfilling the definition of forest, as given above, are considered as managed and are under forest management. The total Italian forest area is eligible under *forest management* activity, since the entire Italian forest area has to be considered managed forest lands. Concerning deforestation activities, in Italy land use changes from forest to other land use categories are allowed in very limited circumstances, as stated in art. 4.2 of the Law Decree n. 227 of 2001.

4.4.1.1 Article 3.3

Changes in forest area were detected on the basis of national forest inventories data. The following afforestation/reforestation activities that occurred or could have occurred on or after 1990 are included in the reporting of these activities:

- Planted or seeded croplands;
- Planted or seeded grasslands;
- Abandoned arable lands which are naturally forested

In Italy all land use categories (cropland, grazing land, forest) are to be considered managed; therefore any land use change occurs between managed lands and, consequently, is direct human-induced. Afforested/reforested areas are to be

⁸ FAO FRA 2010, Italy Country report: <http://www.fao.org/docrep/013/al537E/al537E.pdf>

considered legally bound by national legislation. Usually these activities have resulted from a decision to change the land use by planting or seeding. Abandoned arable lands are left to forest naturally. On the basis of the definitions provided in the Decision 16/CMP.19, natural afforestation and reforestation occurred on abandoned agricultural lands have to be included in the art. 3.3: a frequent forest management strategy, in Italy, consists, in fact, in the exploitation of natural re-growth caused, for instance, by the seed of adjacent trees. In addition the national legislation provides some references to the management strategy of abandoned lands: Law Decree n. 3267/1923 updated in 1999, (art.39 and art. 75), has planned afforestation and reforestation activities on areas for protection purposes (in particular hydro-geological purposes), explicitly forbidding clear cut or clearing on areas undergo under afforestation or reforestation activities (art. 51). Therefore the provision to avoid clear cut activities is a direct consequence of current legislation, as it provides strict constrains for different re-uses of agricultural lands. The same decree (art. 90 and 91) furthermore subsidized land owners to naturally regenerate forest on bare lands or on grasslands. Other (Law Decree 227/2001 Law 353/2000, Law 431/1985), even though focused on specific issues as forest fires and to the protection of nature and landscape are coherent with the previous decrees and complete the legislative framework on the issue; for example, for burnt areas no land use change is allowed and for forest areas, natural restoration of previous ecosystem occurs. In addition afforestation and reforestation activities are essentially linked to political decisions under the EEC Regulations 2080/92 and 1257/99 (art.10.1 and 31.1), therefore induced by man. In particular articles 10.1 and 31.1 of the EEC Regulations 1257/99 (Council Regulation (EC) No 1257/1999 of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF)) refer directly to the provision of income for elderly farmers who decide to stop farming and to the support granted for the afforestation of agricultural land. Extensive forest disturbances have been rare in Italy, except for wildfires. Land-use changes after damage do not occur; concerning wildfires, national legislation (Law n. 353 of 2000, art.10.1) doesn't allow any land use change after a fire event for 15 years. Harvesting is regulated through regional rules, which establish procedures to follow in case of harvesting. Although different rules exist at regional level, a common denominator is the requirement of an explicit written communication with the localization and the extent of area to be harvested, existing forest typologies and forestry treatment. Concerning deforestation activities, in Italy land use changes from forest to other land use categories (i.e. in construction of railways the last years) are allowed in very limited circumstances, as stated in art. 4.2 of the Law Decree n. 227 of 2001, and has to follow several administrative steps before being legally permitted. In addition, clear-cutting is a not allowed practice (Law Decree n. 227 of 2001, art. 6.2).

2.4.11 Article 3.4

Forests in 1 January 1990 were under forest management, since Italy considers all forest land managed, and, therefore, human-induced.

Italian forest resources are totally legally bound; the two main constraints, provided by the laws n. 3267 of 1923 and n. 431 of 1985, compel private and public owners to

⁹ “Afforestation” is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources; “Reforestation” is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.

strictly respect limitations concerning use of their forest resources. As a matter of fact, each exploitation of forest resources must not compromise their perpetuation and therefore, any change of land use, for hydro-geological, landscape and environmental protection in general (the same limitations apply also to burnt areas, following the law n. 353 on forest fires approved in 2000). Consequently unplanned cuttings are always forbidden and local prescriptions fix strict rules to be observed for forestry.

2.4.12 Methods for carbon stock change and GHG emission and removal estimates

The 2003 IPCC Good Practice Guidance for LULUCF has been entirely applied for all the LULUCF categories as detailed data were available from national statistics and from researches at national and regional level.

Methods for estimating carbon stock changes in forests (for Article 3.3 *afforestation/reforestation* and Article 3.4 *forest management*) are the same as those used for the UNFCCC greenhouse gas inventory: a growth model, For-est¹⁰, is used to assess data concerning the growing stock and the related carbon, estimating the evolution in time of the Italian forest carbon pools, according to the GPG classification and definition: living biomass, both aboveground and belowground, dead organic matter, including dead wood and litter, and soils as soil organic matter; it was conceived on an eco-physiological basis since it uses growing stock as drive variable, growth relationships and measured forest parameters.

The model has been applied at regional scale (NUTS2); input data for the forest area, per region and inventory typologies, were the First Italian National Forest Inventory (IFN1985) data and the Inventory of Forests and Carbon pools (INFC2005). On the basis of the main findings of the UNFCCC review process, in relation to the soils pool, Italy has decided to apply the IPCC Tier1, assuming that, for land under *Forest Management* activities, the carbon stock in soil organic matter does not change, regardless of changes in forest management, types, and disturbance regimes; in other words it has to be assumed that the carbon stock in mineral soil remains constant so long as the land remains forest. Therefore carbon stock changes in soils pool, for land subject to *Forest Management*, have been not reported, providing, in the annual Italian reporting¹¹ to UNFCCC a transparent and verifiable information that this pool is not a net source for Italy. Concerning carbon stock changes resulting from *deforestation* activities, due to a lack of detailed information on the land use of the deforested area, since the activities planned in the framework of the registry for carbon sinks are still in progress, a conservative approach was applied, hypothesising that the total deforested area is converted into settlements. Carbon stock changes related to the forest land areas, before deforestation activities, have been estimated, for each year and for each pool (living biomass, dead organic matter and soils), on the basis of forest land carbon stocks deduced from the model For-est. In addition, it should be noted that land use changes due to wildfires are not allowed by national legislation (Law Decree 21 November 2000, n. 353, art.10, comma 1). The loss, in terms of carbon, due to deforested area is computed assuming that the total amount of carbon, existing in the different pools before deforestation, is lost.

¹⁰ Federici S, Vitullo M, Tulipano S, De Lauretis R, Seufert G, 2008. An approach to estimate carbon stocks change in forest carbon pools under the UNFCCC: the Italian case. *iForest* 1: 86-95 URL: <http://www.sisef.it/forest/>

¹¹ ISPRA, 2013. National Inventory Report 2013 – Italian greenhouse gas inventory 1990-2011. ISPRA

Carbon amount released by forest fires has been included in the overall assessment of carbon stocks change. Not having data on the fraction of growing stock oxidised as consequence of fires, the most conservative hypothesis has been adopted: all growing stock of burned forest areas has been assumed to be completely oxidised and so released. Moreover, not having data on forest typologies of burned areas, the total value of burned forest area coming from national statistics has been subdivided and assigned to forest typologies based on their respective weight on total national forest area. Finally, the amount of burned growing stock has been calculated multiplying average growing stock per hectare of forest typology for the assigned burned area. Assessed value has been subtracted to total growing stock of respective typology, as aforesaid.

2.4.13 National Registry for forest carbon sinks

Italy has decided to account for the emissions and removals under Article 3 paragraphs 3 and 4 at the end of the commitment period.

The National Registry for forest carbon sinks was instituted by a Ministerial Decree on 1st April 2008, it is part of *National Greenhouse Gas Inventory 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. It is the instrument to estimate, in accordance with the COP/MOP decisions, the IPCC Good Practice Guidance on LULUCF and every relevant IPCC guidelines, the greenhouse gases emissions by sources and removals by sinks in forest land and related land-use changes and to account for the net removals in order to allow the Italian Registry to issue the relevant amount of RMUs.

Activities planned in the framework of the registry for carbon sinks are still in progress, therefore methodologies for area changes detection and the related uncertainties will be further developed. The inventory of land use (IUTI) has been completed, resulting in land use classification, for all national territory, for the years 1990, 2000 and 2008. A process of validation and verification of IUTI data is currently ongoing and will supply data useful to update and improve the estimations. Data on the last phase of national forest inventory, covering litter, deadwood and soils pools, at NUT2 level, have been released in 2012; deadwood coefficients were used in the estimation process of deadwood biomass, on regional basis. Research studies are currently in place to figure out the proper use of the INFC latest outcomes, in order to estimate and report emissions and removals from litter and soils pools with a lower uncertainty.

5 The Kyoto mechanisms – Joint Implementation (JI) and Clean Development Mechanism (CDM)

Italy recognises that the project based Kyoto Protocol Mechanisms (Joint Implementation (JI) and Clean Development Mechanism (CDM))¹² play a role in meeting its commitment under the Protocol and operators' commitments under Directive 2003/87/CE. The supplementarity principle embodied in the Kyoto Protocol was interpreted by the EU and its Member States as the possibility to use CERs/ERUs up to 50% of the GHG emissions reduction efforts.

Under the EU ETS Italian operators have been allowed to use CERs/ERUs up to 15% of the total quantity of allowances to be allocated. Considering that such quantity is equal to 201.6 MtCO₂/year, the maximum quantity of CERs/ERUs to be used by operators under Directive 2003/87/CE is equal to 30.2 MtCO₂/year. In order to respect the supplementarity principle the maximum quantity of CERs/ERUs to be used by the Government to meet its Kyoto Protocol target is limited to the difference between the 50% of the GHG emissions reduction efforts and the quantity of CERs/ERUs allowed to ETS operators, to date a ceiling of 13.4 Mt/year. Up to 2012 credit equivalent to 1.1 have been acquired see chapter 3.4 of our report.

The credits bought by the Italian Government through the ICF (Italian Carbon Fund), CDCF (Community Development Carbon Fund) and BioCF (BioCarbon Fund) are reported in the table 16 below., from latest update of questionnaire. Italian Carbon Fund . The ICF is open also to the participation of the Italian private and public sector; the minimum contribution from each additional participant is set at US\$1 million. Italy also contributes to the Community Development Carbon Fund (CDCF) and to the BioCarbon Fund (BioCF).

Table 16 - Quantitative contribution of Kyoto mechanisms for the first commitment period

Kyoto mechanism	Total projected quantities for the first commitment period (Gg CO ₂ equivalent)
Total for all Kyoto mechanisms (*)	- 10.15
<i>International emissions trading</i>	- 2
<i>All project based activities</i>	
<i>joint implementation</i>	- 0.15
<i>clean development mechanism</i>	- 8.0

The table refers only to Kyoto mechanisms bought by the Italian Government through the ICF, CDCF and BioCF and not to credits used by ETS operators to comply with their surrender obligation under the EU ETS.

¹² Eligible projects in the energy and end use sector are: Rephasing 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 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.

6 Total effect of policies

The table 17 and 18 summarize the effects of the existing measures described for the Kyoto period and for the 2013-2020 period respectively. The potential overall emission reduction achievable through the implementation of all those measures is reported separately for the existing and the additional measures and the estimated reduction values take into account the potential double counting of emission reduction of renewable sources, see paragraph 4.1.

In the 2008-2012 period the yearly average of total emissions estimated taking into account all the reductions achievable by existing measures (including the purchase of CERs / ERUs), will be equal to 497.2 Mt CO₂.

The contribution of ETS sectors to meet the Kyoto Protocol target is 201.6 MtCO₂/year, corresponding to the total quantity of AAU allocated to the sector.. Please note that this value does not include emissions other than CO₂ (little compared to the total emissivity of the areas ETS). ETS sectors can also use CERs / ERUs up to 15% of the amount of shares allocated to them during the 2008-2012 period, that is 30.2 MtCO₂/year.

The actual emissions of non-ETS sectors are determined as the difference between the National emissions (from Inventory or scenario) and the verified / estimated emissions of the ETS sector.

The “gap” to achieve the Kyoto objective (483.3 MtCO₂/year) is equal, on average, to the sum of the allocated emissions to ETS sector plus the actual emissions of non ETS sector (see Table 17, line “Non ETS sector (WEM scenario - CERs/ERUs use)”). According to the latest emission estimates available in April 2013, this “gap” is equal on average, to 20,3 MtCO₂/year .

The options identified to fill the gap are summarized as follows:

- Carbon sinks
- Further purchase of CERs / ERUs (in respect of the supplementarity principle)
- Purchase of AAUs

Table 17 – Total effect of policies for the 2008-2012 period

	1990	1995	2000	2005	2008	2009	2010	2011	2012
National emissions (WEM scenario)	516.5	530.1	583.6	574.7	541.3	490.8	500.3	488.8	465.0
<i>ETS Sector (verified emissions/WEM scenario)</i>	207.6	213.1	234.6	226.0	220.7	184.9	191.5	190.0	179.1
<i>Non ETS sector</i>	308.9	317.1	349.0	348.8	320.6	305.9	308.8	298.8	285.9
<i>CERs/ERUs already bought by the Government</i>					2	2	2	2	2
Kyoto objective					483.3	483.3	483.3	483.3	483.3
AAU allocated at ETS sector (average)					201.6	201.6	201.6	201.6	201.6
AAU available for non ETS - sectors					282.7	282.7	282.7	282.7	282.7
<i>Non ETS sector (WEM scenario - CERs/ERUs use)</i>	308.9	317.1	327.5	348.9	318.6	303.9	306.8	296.8	283.9
<i>Gap (non-ETS WEM scenario - AAU available for non ETS)</i>					36.9	22.2	25.1	15.1	2.2

Source: ISPRA

Table 18 summarizes the total effect of policies for the post-2012 period, with reference to the 2020 EU objectives. The new divisions of emissions between ETS and non – ETS sectors in 2005, 2008-2010 is reported because the 2013 -2020 targets are based on historical data.

Under the ESD the emissions target for non-ETS sectors in year 2013 and 2020 is 310.1 and 296.3 MtCO₂eq respectively. Considering the emissions according to the WEM scenario the targets should be achieved in 2013 and the gap should be on about 13.8 MtCO₂eq into 2020.

The mitigation options identified to "fill" the gap are reported in Annex 1; the total potential of the measures identified in Annex 1 is about 65.97 Mt CO₂ in 2020, but some of those effects are related to ETS sectors. In addition to the measures identified and reported in Annex 1, Government can use credits from project-based mechanisms to meet its reduction targets (according to limitations introduced by the ESD Decision for supplementarity the quantity of credits to be used by the Government is about 14,6 Mt, 4% of the emissions occurred in 2005).

Table 18 – Total effect of policies for the 2013-2020 period (i)

	1990	1995	2000	2005	2010	2013	2015	2020
National emissions (WEM scenario)	516.5	530.1	583.6	574.7	500.4	477.3	490.2	516.1
<i>ETS Sector (WEM scenario)</i>	207.6	213.1	234.6	226.0	191.5	179.3	193.2	203.3
<i>ETS Sectors (additional activities and gases)</i>				19.2	10.0	10.2	10.5	10.8
<i>Civil Aviation (include in ETS from 2012)</i>				2.2	2.3	2.2	2.3	2.5
<u><i>ETS sector 2013-2020 (WEM scenario + additional activities)</i></u>				247.4	203.8	191.6	206.0	216.7
Non ETS sector (WEM scenario) (ii)	308.9	317.1	349.0	327.4	307.3	285.7	284.1	299.4
<u><i>Effort sharing decision objective</i></u>						310.1	306.2	296.3
Gap						-24.4	-22.0	3.1
Planned P&M (electricity and heat), Annex 1						1.78	11.81	65.97
Planned P&M in ESD sector (heat)						0.58	4.62	31.94
<u><i>Non ETS sector (WAM scenario)</i></u>				<u>327.4</u>	<u>307.3</u>	<u>285.1</u>	<u>279.5</u>	<u>267.5</u>
Gap						-25.0	-26.7	-28.8

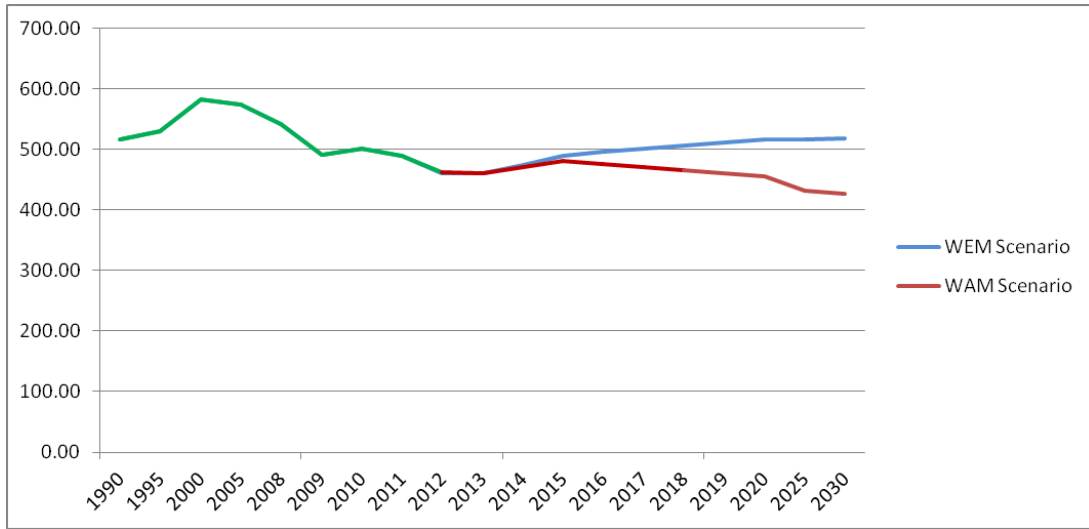
Notes:

i all data in the table are preliminary ISPRA estimates subject to EU Commission approval

ii the data are different from table 18 because the division between ETS and non ETS follows different rules for post Kyoto period

Total effect of policies is summarized in Figure 7. Data up to 2011, green line, are inventory data. The blue line starting from 2011 show the emissions in WEM and the red line starting from 2011 show the emissions in WAM scenarios.

Figure 7 - Historical and projected emissions, kt CO₂ eq



7 Implementation of European legislation, institutional and legal arrangements

7.1 Implementation of Common and Coordinated Policies and Measures in Italy

In Italy all Common and Coordinated Policies and Measures (CCPM's) of the European Union have a remarkable impact and can be considered as a base issue for national policies. The impact of CCPM's can be roughly divided in two categories. Some CCPM's (such those referred to civil and transport sectors) reduce emissions much beyond what is achieved by or possible with national policies. The second category contains CCPM's which do not lead to any additional emission reductions beyond those generated by national policies, but do have other benefits which contribute to the effectiveness and efficiency of national policies.

The benefits of CCPM's are quite high in the civil and transport sectors. It is a matter of fact that, for a series of different reasons, in our national legislative framework has been almost impossible to implement emission saving policies in these sectors without a link to an EU directive. The adoption and wide spread success of energy labeling in appliances is an example of those policies: the diffusion of efficient appliances did take off a few years later than in other EU countries and it is questionable that it could even go out of a nice market without EU directive.

In the regional level legislation the situation is different, but only a few Regions do implement some policies regardless on the EU legislation; also in those cases CCPM's give an important contribution improving the 'level playing field' and addressing competitive distortions which might otherwise result from unilateral introduction of policies.

On the other hand, Italy has an historical tradition in energy efficiency in the energy and industrial sectors and a quite high use of renewable sources compared to EU average. Those sectors are generally quite efficient with reference to the EU average. Effective energy efficiencies policies are implemented nationally, as the diffusion of combined cycles for electricity generation. In this cases a EU framework gives in any case a stimulus to extend and improve some policies , as the use of renewables in the electricity generation.

7.2 Legal and institutional steps to implement the emissions reductions commitments

2.4.14 Decision making process related to climate change

The Inter-Ministerial Committee for Economic Planning (CIPE), chaired by the Ministry of Economy, has the task to approve the national program for greenhouse gases emissions reduction. The first program ("National program for the containment of carbon dioxide emissions") was approved in 1994 with the aim to stabilize CO₂ emissions by 2000 at 1990 level. Afterwards the program was enhanced and updated

(CIPE deliberations of 1997 and 1998¹³) and in 2002, when the Kyoto Protocol was ratified¹⁴, an overall national climate change strategy to meet the Kyoto Protocol target was approved (CIPE deliberation 123/2002) according to the indications provided by the ratification Law (see paragraph below). The financial support and legislative instruments to implement the strategy are identified through the Financial Law and allocated at the central and local bodies on the basis of the respective competences.

Further details about the CIPE and its activities related to climate change are described below.

2.4.15 Monitoring and evaluation of progress with climate policies and measures

The CIPE deliberation 123/2002 has established an inter-Ministerial Technical Committee (CTE). The CTE includes representatives of the Ministries of Economy, Economic Development, Agricultural, Food and Forestry Policies, Infrastructures, Transport, University and Research, Foreign Affairs and of Regions. The main task of the CTE is to monitor the emissions trend, the status of the implementation of the policies and measures identified in the overall national strategy and to identify the potential further measures to meet the Kyoto Protocol target, if needed. On the basis of the analysis performed the CTE proposes to CIPE an update of the overall national strategy. The Ministry for the Environment, Land and Sea has the leadership of the CTE. In 2009, the CIPE through its deliberation n. 16/2009, decided to enhance the institutional framework through the reconstitution of CTE at level of general directors and its integration with representatives of the Prime Minister office. The reconstituted CTE is working to propose to CIPE an update of the national strategy.

As reported in the previous paragraph in march 2013 has been approved the new national strategy. In this resolution are envisaged a list of measure useful to achieve the Climate and Energy Package targets.

2.4.16 Law 120/2002 ratifying the Kyoto Protocol

Italy ratified the Kyoto Protocol through law n. 120 of 1 June 2002. The law prescribed the review of the CIPE Deliberation of 1998 (“Guidelines for national policies and measures for the reduction of greenhouse gas emissions”) and required the identification of new policies and measures aimed at:

- increasing the energy efficiency of the national economic system and fostering the use of renewable energy sources;
- increasing carbon dioxide removals deriving from land use, land-use changes and forestry, as established under article 3 paragraphs 3 and 4 of the Kyoto Protocol;
- implementing the Clean Development and the Joint Implementation mechanisms established under the Kyoto Protocol;
- fostering Research and Development activities in order to: promote hydrogen as a main fuel in energy systems and in the transport sector; promote the construction of:

¹³ See second national communication of Italy on climate change to the UNFCCC.

¹⁴ Law n. 120 of 1 June 2002, “Ratifica ed esecuzione del Protocollo di Kyoto alla Convenzione Quadro delle Nazioni Unite sui Cambiamenti Climatici, fatto a Kyoto l’11 dicembre 1997”, in GU n. 142 of 9 June 2002.

biomass plants; solar thermal power plants; wind and photovoltaic power plants; waste and biogas fuelled power plants.

7.3 Regions

Italy is an example of a Regional State, meaning a form of state in which a sovereign public

entity coexists with other territorial entities that are given a legal status valid only domestically, together with a certain degree of legislative and administrative independence. In addition to the regions, the territorial entities into which the Italian State is subdivided are the provinces and the municipalities. Only the Regions, however, are constitutional entities, given that they have autonomy in designing their policy, and are part of the constitutional structure of the State.

The most recent trend would seem to favour the transfer to the regions of responsibilities once managed on the central level in order to achieve the objective of establishing a system of administrative federalism, even though the great majority of the prerogatives in the field of the environment have been left under the control of the central government. The sole prerogative of some significance to be removed from State control is the power of planning: all national plans were eliminated, with the exception of the plan for defending the sea and the coasts from pollution, the plan for purifying waste water, and the plans for the national watershed.

Even in the context of a limited transfer of functions, such as that which has taken place in the field of the environment, the implementation of Legislative Decree 112/98 provided the regions with an opportunity to rearrange, within a unified framework, their own prerogatives, together with those of the provinces, of the individual and associated municipalities and of the mountain communities, setting a number of common principles for the entire field, or for interconnected compartments of the same, such as the environment and energy. Within this scenario, many regions, drawing on the legal norms currently in force, have redesigned their internal rules and regulations, reserving:

- for the provinces, the entire planning system in the field of the environment and energy, under the assumption that the provincial plans for territorial coordination, first contemplated under Law 142 and later reinforced by the provisions of art. 57 of Legislative Decree no. 112/98, are designed to safeguard environmental resources and optimize the use of energy resources; as a result, the overall system for the authorization of all production and service-industry activities is the prerogative of the provinces.
- for the municipalities, full responsibility for services to citizens and initiatives on the municipal level, employing the municipal urban-planning instruments for decisions regarding the approach to environmental defense and energy concerns (acoustic zoning, reclamation initiatives, long-distance heating, energy savings);
- for the regions, the role of taking concerted action with the Central State regarding underlying decisions on legislative and administrative guidelines, as well as strategic planning, in coordination with local government bodies, and after having received the opinions of the local economic, social, scientific and environmental forces, plus the setting of quality objectives and the monitoring of the results.

7.4 National Inventory

ISPRA is in charge of the development and compilation of the national emission inventory on the basis of a Legislative Decree issued on 27th February 2008 which institutes the National System for the Italian Greenhouse Gas Inventory. In order to establish compliance with national and international commitments, the national GHG emission inventory is compiled and communicated annually by ISPRA to the competent institutions, after endorsement by the Ministry for the Environment, Land and Sea.

Specifically, ISPRA is responsible for all aspects of national inventory preparation, reporting and quality management. Activities include the collection and processing of data from different data sources, the selection of appropriate emissions factors and estimation methods consistent with the IPCC 1996 Revised Guidelines, the IPCC Good Practice Guidance and Uncertainty management and the IPCC Good Practice Guidance for land use, land-use change and forestry, the compilation of the inventory following the QA/QC procedures, the assessment of uncertainty, the preparation of the National Inventory Report and the reporting through the Common Reporting Format, the response to the review process, the updating and data storage.

7.5 National System for Monitoring Greenhouse Gasses

A Legislative Decree, issued on 27th February 2008, institutes the National System for the Italian Greenhouse Gas Inventory.

As required by article 5.1 of the Kyoto Protocol, Annex I Parties shall have in place a National System by the end of 2006 at the latest for estimating anthropogenic greenhouse gas emissions by sources and removals by sinks and for reporting and archiving inventory information according to the guidelines specified in the UNFCCC Decision 20/COP.7. In addition, the Decision of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions (280/2004/EC) requires that Member States establish a national greenhouse gas inventory system by the end of 2005 at the latest and that the Commission adopts the EC's inventory system by 30th June 2006.

Italy has therefore developed a national inventory system, National System, which includes all institutional, legal and procedural arrangements for estimating emissions and removals of greenhouse gases and for reporting and archiving inventory information.

The Italian National System, currently in place, is fully described in the document 'National Greenhouse Gas Inventory System in Italy' (ISPRA, 2008).

A specific unit of ISPRA is responsible for the inventory compilation in the framework of both the Convention on Climate Change and the Convention on Long Range Transboundary Air Pollution. All the measures to guarantee and improve the transparency, consistency, comparability, accuracy and completeness of the inventory are undertaken.

The Italian greenhouse gas inventory is communicated to the Secretariat of the Framework Convention on Climate Change and to the European Commission in the framework of the Greenhouse Gas Monitoring Mechanism, after endorsement by the Ministry for the Environment, Land and Sea.

Annex 1

Summary Table: Policies and Measures in Italy

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO ₂ eq	Mg CO ₂ eq
				2015	2020
WEM SCENARIO – Implemented Measures					
Third "Conto Energia" (art.3 paragraph 1, decree 6 august 2010) and Fourth "Conto Energia" (Decree 5 may 2011)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 8000 MW	Renewables	implemented	2.3	2.3
Third "Conto Energia" : photovoltaic (art.3 paragraph 2, decree 6 august 2010)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 3000 MW	Renewables	implemented	0.90	0.90
Green Certificate - budget law 2008	Green Certificate increased every year by 0,75% for 2007 - 2012 and establish "omnicomprensiva" rate for plants <1 Mwe	Renewables	implemented	4.00	4.00
European regional development fund (ERDF), National Strategic Framework 2008-2013	Supporting system for RES whit Regional operative program (POR) and Interregional operative program (POIN)	Renewables	implemented	1.40	1.40
White certificates - decree december 2007	Supporting CHP and district heating plants for 2008-2012	Energy supply - Cogeneration	implemented	0.97	0.97
National Strategic Framework 2007-2013 - ERDF	Supporting CHP and energy savings with POR and POIN	Energy supply - Cogeneration	implemented	0.24	0.24

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO2 eq	Mg CO2 eq
				2015	2020
White certificates - decree december 2007	Supporting electric energy saving for the period 2008-2012	Industry	implemented	2.02	2.02
Legislative decree 201/07 (trasposition of directive 2005/32/EC- first regulations)	Installation of highly efficient electric motors and inverters through minimum mandatory standards	Industry	implemented	0.54	1.92
European regional development fund (ERDF), National Strategic Framework 2008-2013	Supporting electric energy saving with POR and POIN	Industry	implemented	0.66	0.66
Building Regulation (Legislative decree 192/05 as amended by legislative decree 311/06)	Minimum mandatory standards on new and existing buildings (Energy Efficiency)	Civil sector	implemented	2.18	3.61
Budget law 2007 and budget law 2008	Supporting of energy saving in existing buildings through tax deduction of 55%	Civil sector	implemented	0.61	0.61
Budget law 2009	Supporting of energy saving in existing buildings through tax deduction of 55%	Civil sector	implemented	0.44	0.44
White certificates - decree december 2007	Supporting of energy saving 2008-2012 (Energy Efficiency)	Civil sector	implemented	3.12	3.12
Legislative decree 201/07 (trasposition of directive 2005/32/EC- first regulations)	First regulation on mandatory energy efficiency standards for energy-using products	Civil sector	implemented	0.87	2.60

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO2 eq	Mg CO2 eq
				2015	2020
National Strategic Framework 2007-2013 - ERDF	Supporting electric energy saving with POR and POIN	Civil sector	implemented	0.42	0.42
Infrastructural measures	High Capacity and High Speed road. Regional networks for passengers and freight, subway	Transport	implemented	3.75	5.70
National Strategic Framework 2007-2013 - FESR	Intermodal infrastructure projects: metropolitan railways	Transport	implemented	5.40	10.20
Emission standard for new car (Regulation (EC) No 443/2009)	Fleet update at 120 g CO2/km in 2015 and 95 g CO2/km in 2020	Transport	implemented	0.32	1.28
Legislative decree 128/05(trasposition of directive 2003/30/EC)	Mandatory use biofuels (target 4.5% to 2012)	Transport	implemented	1.49	1.49
Directive 2009/28/EC	Mandatory use biofuels (target 10% to 2020)	Transport	implemented	0.59	1.58
Nitric acid	Reduction of N2O emissions in nitric acid production plants	Industrial Processes	implemented	0.74	0.74
Nitrogen fertilizer	Rationalization in the use of nitrogen fertilizer	Agriculture	implemented	0.79	0.79
Animal storage	Recovery of biogas from animal storage system	Agriculture	implemented	0.4	0.4
Separate collection	Compliance with separate collection targets and reduction of biodegradable waste disposed into landfills	Waste	implemented	3.70	3.70

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO2 eq	Mg CO2 eq
				2015	2020
WAM SCENARIO – Planned Measures					
National Action Plan for Renewable Energy 2010	Measures under the NAP - RES 2010 reducing energy losses through the modernization of the national electricity transmission grid and of the distribution grid	Renewables	planned	0.00	0.99
National Action Plan for Renewable Energy 2010 - Legislative decree 28/2001 - Kyoto fund	Measures to achieve the 2020 target provided by the NAP 2010 and further incentives for the implementation of the Decree. 28/2011 to reach the 110 TWh target from renewable sources, including the development of smart grid. Supporting small interventions for renewable energy with capital loans at subsidized interest rate.	Renewables	planned	0.80	6.32
New measure of promoting and supporting RES-E	Measures to be determined after the achievement of 130 TWh renewable electricity target, as indicated in the "National Energy Strategy" report	Renewables	planned	3.5	10.00
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011	Measures for the promotion of thermal energy from renewable sources and incentives to small-scale interventions to increase the production of thermal energy from renewable sources	Renewables	planned	0	10.6

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO2 eq 2015	Mg CO2 eq 2020
National Action Plan for Energy Efficiency 2011 - 2006/32 Directive - Supporting of High efficiency CHP (09/05/2011 Law) with white certificates - Kyoto fund	Promotion of cogeneration and trigeneration	Energy supply - Cogeneration	planned	1.05	2.26
National Action Plan for Energy Efficiency 2011 - 2006/32 Directive - Supporting of High efficiency CHP (09/05/2011 Law) with white certificates 2012-2016 - Kyoto fund	Promotion of cogeneration and trigeneration	Energy supply - Cogeneration	planned	0.46	1.49
National Action Plan for Energy Efficiency 2011 - 2006/32 Directive - White certificates 2012 - 2016	Further extend of energy saving targets (White certificates 2016-2020)	Industry	planned	1.31	3.50
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011 - White certificates 2016 - 2020	Promoting energy efficiency in implementing the actions foreseen in the NAP 2010 (efficient lighting systems, ICT systems, replacement of electric heating systems) for the period 2016-2020	Industry	planned	0	3.58

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO2 eq 2015	Mg CO2 eq 2020
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011 - White certificates 2016 - 2020	Further use up to 2020 of the white certificate system to promote measures of mechanical vapor compression, energy saving in the chemical industry, glass, paper and heat recovery in industrial energy intensive processes	Industry	planned	0	3.90
Reformulation of energy taxation	Promoting the use of products and services with low carbon content also with measures of information	Industry	planned	0	1.50
Legislative decree 28/2011	Promotion of energy saving	Industry	planned	0.61	1.64
Legislative decree 28/2011	Promoting energy saving in the residential sector (public, domestic, tertiary): insulation, replacement windows and boilers, installation of heat pumps and solar thermal panels	Civil sector	planned	1.76	4.69
National Action Plan for Energy Efficiency 2011 - White certificates 2012 - 2016	Promoting energy saving	Civil sector	planned	0.8	1.23
National Action Plan for Renewable Energy 2010 and National Action Plan for Energy Efficiency 2011 - White certificates 2016 - 2020	Promoting energy saving	Civil sector	planned	0.00	2.53

Name of PAM	Objective	Sector	Status	Effect of the PAM	Effect of the PAM
				Mg CO2 eq	Mg CO2 eq
				2015	2020
Directive 2010/31/EC - New standards of efficiency in buildings	Further reduction of energy consumption in buildings and promotion of renewable energy in the building and incentive mechanism through the tax deduction	Civil sector	planned	0.00	4.00
Budget law 2009 - Extending tax deduction of 55%	Energy saving in existing buildings	Civil sector	planned	0.34	1.15
Reformulation of energy taxation	Promoting the use of low carbon products and services also with measures of information	Civil sector	planned	0.00	1.00
Intermodal measures	National Action Plan for Renewable Energy 2010 - Infrastructures, intermodal and increasing of the electric public transport	Transport	planned	1.17	3.50
Measures to improve the fleets update - Regulation (EC) No 443/2009	Reduce the average emissions	Transport	planned	0.00	1.80
Reformulation of energy taxation	Promoting the use of low carbon products and services also with measures of information	Transport	planned	0	0.50

Annex 2

IPCC source categories related to sectoral definitions

sector	activity	IPCC source category
energy	centralized and own generation of power, energy distribution, oil and gas production, refineries	1A1, 1B, part of 2 ¹
industry	chemicals, foodstuffs and luxury items, paper, basic metals, construction materials, other metals, other industry, cokes manufacturing, construction	1A2, part of 2
transport	transport incl. mobile equipment and off-road vehicles from construction, agriculture and services	1A3, part of 1A4c, part of 1A2f
agriculture	agriculture and horticulture excl. mobile equipment and off-road vehicles	1A4c,4
waste	waste incineration ² and landfills	6
buildings	households, services excl. mobile equipment and off-road vehicles	3, 1A4a, 1A4b

¹emissions due to flue gas desulphurization

²when electricity is generated by waste incineration, the emissions are allocated to the energy sector.

IPCC category 5 is not included in the projections. The forest carbon balance is projected separately.

Annex 3 - Actual emissions by gas and sector. The figures are taken from the CRF 2011 submission.

GREENHOUSE GAS EMISSIONS	CO ₂ equivalent (Gg)									
	Base year (1990)	1995	2000	2005	2006	2007	2008	2009	2010	2011
CO ₂ emissions including net CO ₂ from LULUCF	421,542.94	414,327.39	436,337.69	449,572.70	453,267.46	456,872.85	426,923.64	374,741.69	381,855.44	383,153.72
CO ₂ emissions excluding net CO ₂ from LULUCF	434,656.30	444,943.68	462,277.69	488,078.03	483,542.57	475,441.19	463,921.58	415,088.93	425,499.38	414,239.22
CH ₄ emissions including CH ₄ from LULUCF	44,358.93	44,494.56	46,191.08	41,266.94	39,716.93	40,034.74	38,403.82	38,282.40	37,452.63	36,756.26
CH ₄ emissions excluding CH ₄ from LULUCF	43,760.90	44,335.69	45,843.74	41,106.94	39,577.86	39,312.65	38,191.59	38,013.00	37,290.20	36,567.66
N ₂ O emissions including N ₂ O from LULUCF	37,679.71	38,568.73	39,627.21	37,750.97	32,394.14	31,919.91	29,700.30	28,153.54	27,132.14	26,939.29
N ₂ O emissions excluding N ₂ O from LULUCF	37,396.31	38,422.16	39,483.23	37,667.51	32,321.92	31,678.64	29,615.20	28,052.98	27,075.62	26,873.17
HFCs	351.00	671.29	1,985.67	5,400.56	6,106.19	6,855.26	7,512.98	8,163.94	8,744.58	9,306.04
PFCs	2,486.74	1,266.38	1,217.43	1,715.00	1,713.61	1,652.10	1,500.59	1,062.81	1,330.83	1,454.54
SF ₆	332.92	601.45	493.43	465.39	405.87	427.55	435.53	398.02	373.27	351.38
Total (including LULUCF)	506,752.24	499,929.81	525,852.52	536,171.56	533,604.20	537,762.41	504,476.86	450,802.41	456,888.90	457,961.24
Total (excluding LULUCF)	518,984.17	530,240.65	551,301.20	574,433.42	563,668.03	555,367.39	541,177.47	490,779.67	500,313.89	488,792.02
GREENHOUSE GAS SOURCE AND SINK CATEGORIES										
1. Energy	417,736.09	431,111.04	449,686.56	471,901.71	466,813.42	458,164.58	449,202.26	405,192.17	415,299.28	404,443.53
2. Industrial Processes	38,389.92	35,928.88	36,249.03	42,591.89	38,143.47	38,601.34	35,668.37	30,743.13	31,829.82	31,640.92
3. Solvent and Other Product Use	2,454.62	2,234.87	2,301.35	2,122.86	2,125.72	2,075.05	1,953.73	1,829.28	1,676.71	1,656.28
4. Agriculture	40,738.59	40,520.46	40,135.38	37,362.53	36,767.15	37,379.82	36,015.43	34,776.85	33,722.59	33,530.43
5. Land Use, Land-Use Change and Forestry ⁽⁵⁾	-12,231.93	-30,310.84	-25,448.68	-38,261.87	-30,063.83	-17,604.98	-36,700.62	-39,977.27	-43,424.99	-30,830.78
6. Waste	19,664.96	20,445.39	22,928.87	20,454.43	19,818.27	19,146.60	18,337.68	18,238.24	17,785.50	17,520.85
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)⁽⁵⁾	506,752.24	499,929.81	525,852.52	536,171.56	533,604.20	537,762.41	504,476.86	450,802.41	456,888.90	457,961.24

Annex 4 – Emissions Projections

GHG emissions disaggregated by emission sector (Gg CO₂ eq.) WEM Scenario

	2010	2011	2015	2020
Total excluding LULUCF	500,375.61	488,876.03	490,154.17	516,078.94
Total including LULUCF	441,436.03	440,638.18	452,034.18	483,992.85
1. Energy	415,360.99	404,475.85	404,317.09	427,012.46
2. Industrial Processes	31,829.82	31,692.61	33,257.93	37,418.72
3. Solvent and Other Product Use	1,676.71	1,656.28	1,670.00	1,720.00
4. Agriculture	33,722.59	33,530.43	33,520.23	33,425.78
6. Waste	17,785.50	17,520.85	17,388.91	16,501.97
7. Other				
5. LULUCF	-58,939.57	-48,237.85	-38,119.99	-32,086.09

Source: ISPRA

GHG emissions disaggregated by end-use sector (Gg CO₂ eq.) WAM Scenario

	2010	2011	2015	2020
Total excluding LULUCF	500,375.61	488,876.03	481,954.17	455,036.66
Total including LULUCF	441,436.03	440,638.18	443,834.18	422,950.58
1. Energy	415,360.99	404,475.85	396,117.09	365,970.18
2. Industrial Processes	31,829.82	31,692.61	33,257.93	37,418.72
3. Solvent and Other Product Use	1,676.71	1,656.28	1,670.00	1,720.00
4. Agriculture	33,722.59	33,530.43	33,520.23	33,425.78
6. Waste	17,785.50	17,520.85	17,388.92	16,501.97
7. Other				
5. LULUCF	-58,939.57	-48,237.85	-38,119.99	-32,086.09

Source: ISPRA

Annex 5 – Emissions Projections for the Energy Sector

CO₂ emissions from energy sector, Mt CO₂ - WEM Scenario

	2010	2011	2015	2020
1. Energy Industries	132.56	130.57	129.65	139.30
2. Manufacturing Industries and Construction	60.02	59.85	63.55	72.35
3. Transport	117.48	116.43	108.80	113.25
4. Other Sectors - Civil sectors	90.54	83.09	88.20	87.60
5. Other	0.63	0.49	0.45	0.50
<i>Total</i>	<i>401.22</i>	<i>390.43</i>	<i>390.65</i>	<i>413.00</i>

Source: ISPRA

CO₂ emissions from energy sector, Mt CO₂, WAM Scenario

	2010	2011	2015	2020
1. Energy Industries	132.56	130.57	127.95	105.58
2. Manufacturing Industries and Construction	60.02	59.85	60.58	66.74
3. Transport	117.48	116.43	108.63	101.00
4. Other Sectors - Civil sectors	90.54	83.09	84.84	78.20
5. Other	0.63	0.49	0.45	0.50
<i>Total</i>	<i>401.22</i>	<i>390.43</i>	<i>382.45</i>	<i>352.03</i>

Source: ISPRA

References

- Ministry for the Environment, Land and Sea (2010): *Fifth National Communication under the UN Framework Convention on Climate Change*
- Ministry for the Environment, Land and Sea (2007): *Fourth National Communication under the UN Framework Convention on Climate Change*
- ISPRA (2008): *National Greenhouse Gas Inventory System in Italy*
- ISPRA (2013): *Italian Greenhouse gases Inventory 1990 – 2011, National Inventory Report*
- IPCC (2000): *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
- ENEA (2008): *Rapporto Energia e Ambiente – 2007, analisi e scenari*
- ENEA "Scenari energetici per l'Italia da un modello di equilibrio generale (Markal-macro)", M. Contaldi, F. Gracceva, Enea Technical Report, ENEA, 2004, ISBN 88-8286-108-2
- Ministry of Economic Development, Infrastructures and Transport (2010) PAN – *Piano di Azione Nazionale per le Energie Rinnovabili (direttiva 2009/28/CE)*
- 8th march 2013 Interministerial Decree of Ministry of Economic Development, Infrastructures and Transport and Ministry of Environment, Land and Sea – *Strategia Energetica Nazionale*
- 8th march 2013 Interministerial Committee for Economic Planning (CIPE) – *Piano di Azione Nazionale per la riduzione dei livelli di emissione di gas ad effetto serra*