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Istituto Superiore per la Protezione  
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# 2011 Italy Climate Policy Progress Report

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*The present report has been submitted to the European Commission pursuant to Decision No 280/2004/EC, Article 3(2) by the Ministry of Environment of Italy, in May 2011*

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# 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 2010, 2015 and 2020, 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. Regarding the planned policies and measures it has to be underlined that the discussion on the update of national strategy is still ongoing, therefore such policies and measures are subject to further changes and to the approval of the strategy
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 not only the Implementing Provisions adopted under 280/2004/EC (Commission Decision 2005/166/EC) but also the UNFCCC reporting guidelines (FCCC/CP/1999/7).



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## 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 known by the end of 2010.

The chapter summarizes policies in three sections:

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

Each section describes groups of policies and measures organized by greenhouse gas; only the most important ones are described in detail. The paragraphs need to be read in conjunction with 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").

The national strategy to meet the Kyoto Protocol target approved by the Interministerial Committee for Economic Planning (CIPE) with deliberation n. 123/2002 provides alongside with domestic measures for the use of the Clean Development and Joint Implementation mechanisms up to a maximum of 50% of the total reduction effort.

At the moment the national strategy is being updated in order not only to ensure the compliance with the Kyoto Protocol target, but also to put the country on the right path towards the commitments undertaken under the "Effort Sharing Decision".

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## 2.2 The climate and energy package

In the January 2007 the European Commission presented an integrated energy/climate change package that addressed the issues of energy supply, climate change and industrial development.

To begin this process, the EU set a series of targets to be met by 2020, known as the "20-20-20" targets. These are:

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels
- 20% of EU energy consumption have to come from renewable resources
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

In January 2008 the European Commission proposed binding legislation to implement the 20-20-20 targets. This 'climate and energy package' was agreed by the European Parliament and Council in December 2008 and became law in June 2009.

The core of the package comprises three pieces of complementary legislation:

1. A revision and strengthening of the Emissions Trading System (ETS), the EU's key tool for cutting emissions cost-effectively. A single EU-wide cap on emission allowances will apply from 2013 and will be cut annually, reducing the number of allowances available to businesses to 21% below the 2005 level in 2020. The free allocation of allowances will be progressively replaced by auctioning, and the sectors and gases covered by the system will be somewhat expanded.
2. An 'Effort Sharing Decision' governing emissions from sectors not covered by the EU ETS, such as transport, housing, agriculture and waste. Under the Decision each Member State has agreed to a binding national emissions target for 2020 which reflects its relative wealth. The target for Italy is to reduce its emissions on 13%.
3. Binding national targets for renewable energy which collectively will lift the average renewable share across the EU to 20% by 2020 (more than double the 2006 level of 9.2%). The national target from a renewables share is on about 17%.

The climate and energy package creates pressure to improve energy efficiency but does not address it directly. This is being done through the EU's energy efficiency action plan.

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## 2.3 Cross Sectoral Policies

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

#### 2.3.1.1 *Directive 2009/28/EC - National Action Plan for Renewable Energy 2010*

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 NAP set objectives of the Member States for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020, taking into account the effects of other policy measures on energy efficiency

On the level of sectoral policy, lines of action are outlined based on the weight of each area of action on the gross energy consumption total:

- Final consumption for heating / cooling
- Fuel consumption in the transport sector
- Final consumption of electricity

In order to achieve the national goals, Italy intends to strengthen and rationalize the support mechanisms already existing in an integrated way that it's:

- effective, in order to concentrate efforts along directions of maximum contribution to the objectives;
- efficient, in order to introducing flexibility in support of incentives by limiting their contributions the minimum necessary to meet the market defailances;
- economically sustainable for the final consumer, who is the person who maintains large part of the burden of incentive;
- inclusive and balanced with respect to all the measures to be promoted in the areas of heat, transport, electricity.

The measures that could be used to comply the target are reported below.

#### 2.3.1.2 *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 2007<sup>1</sup> set the new targets for the years 2008 and 2009 and the prolonging of system at 2012 according to the following table:

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

**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

The definition of technical rules, the implementation, monitoring and enforcement of the whole mechanism are under the responsibility of the Authority for Electric Energy and Gas (AEEG). The AEEG developed three evaluation methods:

- a default (deemed savings) method: savings are calculated according to the objects involved in the project (i.e. number of CFLs), no in-field measures are required;
- an engineering method: simple calculations and few measures required in-field;
- detailed project with a complete energy monitoring plan, subject to AEEG/ENEA pre-approval

Projects validation as well as energy savings certification are under AEEG's responsibility ; verification is carried out via:

- control of project documentation prepared according to a predefined reporting format and sent to AEEG by stakeholders. Both quantitative and qualitative project characteristics are checked for validation
- random on-site audits (i.e.: control of more detailed project-related documentation as well as audit at customers' premises)

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

The White Certificates system has until now achieved energy savings targets higher than those fixed by the Decrees:

- 2005 – 2006: 286,837 toe;
- 2006 – 2007: 611,529 toe;
- 2007 – 2008: 903,627 toe;
- 2008 – 2009: 1,818,000 toe

From the 31<sup>st</sup> December 2009 to the 31<sup>st</sup> May 2010, the emission of other 1,463,925 TEE was approved.

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.

In Table 2 is reported the share of certified energy saving from the beginning of mechanism to the 31<sup>st</sup> May 2010.

**Table 2 - Share of certified energy saving from the beginning of mechanism to the 31st May 2010**

Description of project	% of total to 31 <sup>st</sup> December 2009	% of total to 31 <sup>st</sup> May 2010
Cogeneration plant to produce heat in the industrial process	53%	47%
Activities to reduce thermal needs of industrial process	10%	19%
Activities in electric use of industry	16%	18%
Activities to reduce thermal needs of civil sector	9%	8%
Activities on production and distribution system of energy in civil sector	5%	3%
Activities in electric use of civil sector	3%	3%
Activities to improving the efficiency in public lighting	4%	3%

The Plan of action for the energy efficiency 2007 set a target of reduction of end use energy consumption for the year 2016; in this context an extension of the objectives of the white certificate system has been previewed. These new objectives have been considered in this report as adopted measures. A further extension of the white certificate system objective till 2020 is foreseeable, so it has been considered as a planned measure.

### 2.3.1.3 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

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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 1<sup>st</sup>, 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 GSE<sup>2</sup>. 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.

Several recent measures have brought in important changes to the system envisaged by legislative decree 79/99.

- Legislative decree 387/03: increased the minimum 2% quota of renewable electricity to be fed into the grid by 0.35% per year for the period 2004 – 2006 and set the deadlines by which the increases for the periods 2007—2009 and 2010—2012 had to be updated. The Decree also allowed Green Certificates to be issued for biomass and waste-fuelled plants for 12 years (instead of the original 8 years).
- Decree 24 October 2005: introduced the obligation on the GSE to purchase the Green certificates that could not be sold on the market, due to insufficient demand.
- Legislative decree 152/06: extended the period during which the incremental production of renewable electricity entitles to the right to obtain Green Certificates from 8 to 12 years.
- Budget law 2007: repealed the provision set forth in legislative decree 387/03 that qualified cogeneration plants combined with district heating and plants producing electricity from the non biodegradable fraction of waste and RDF for the issuance of Green Certificates.
- Budget law 2008<sup>3</sup>: established that, for the period 2008-2012, the minimum quota of renewable electricity to be fed into the grid has to be increased every year by 0,75%. It also introduces a specific support scheme for renewable energy from biomass (subparagraph 144), as well as a fixed overall subsidy for renewable energy produced by installation with a capacity lower than 1 MW (subparagraph 145).

#### 2.3.1.4 *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 period of 15 years.

#### 2.3.1.5 *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

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2 Gestore dei Servizi Elettrici S.p.A.

3 Law 244 of 24 December 2007

photovoltaic systems, solar systems and 25 years for thermodynamic) through a tariff for all energy produced by the plants (feed in premium).

## 2.4 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 20<sup>th</sup> 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 shows emissions projection for ETS sectors in the second trading period (2008-2012) and the difference between the emissions projections and allocation. .

At the moment it is not possible to make the same evaluation for the third trading period (2013-2020) because allowances for such period have not been determined and allocated yet at Members' State Level. As a consequence the effect of EU ETS implementation cannot be evaluated for 2013-2020.

**Table 3 - Emissions projections and allocations for ETS sectors**

	2008 Mt CO <sub>2</sub>	2009 Mt CO <sub>2</sub>	2010 Mt CO <sub>2</sub>	2011 Mt CO <sub>2</sub>	2012 Mt CO <sub>2</sub>
Emission projections (WEM scenario)	220.7	184.9	190.1	194.2	198.2
Allocation (*)	201.6	201.6	201.6	201.6	201.6
Difference between emissions projections and allocation	19.1	-16.7	-11.5	-7.4	-3.4
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.

### 2.4.1 Energy Production and transformation Sector

The Energy production and transformation sector is under Emission Trading Scheme and the CO<sub>2</sub> 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

### 2.4.1.1 Renewable energy

Policy instruments currently in effect are the use of Green Certificate that are explain in the paragraph 2.3.1.3 and the Conto Energia reported in paragraph 2.3.1.5 to support the production of Photovoltaic (PV) electricity.

All the measures included in this sector are implemented measures and were included in the WEM Scenario.

At 2020 17% of the final energy consumption shall be supplied from renewable sources, according to renewable directive. The WEM scenario at 2020 will bring the percentage up to about 14% of the total production. The further expansion of renewable use with the implementation of the planned measures reported in Table 4 will bring the percentage up to 17%.

In the Table 4 are reported impacts for every single measures.

**Table 4 – Summary of policies and measures in the energy sector – Renewable energy sources**

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Gg CO2 eq.)		
		2010	2015	2020
<b>WEM SCENARIO –Implemented Measures</b>				
Third "Conto Energia" : photovoltaic (decree 6 august 2010)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 3000 MW is reached (art.3 paragraph 2)	464.58	944.46	944.46
Green Certificate - budget law 2008	Green Certificate increased every year by 0,75% for 2007 - 2012 and establish "omnicomprensiva" rate for plants <1 Mwe	596.70	4,165.38	4,594.50
National Strategic Framework 2008-2013 European regional development fund (ERDF)	Supporting system for RES whit Regional operative program (POR) and Interregional operative program (POIN)	0.00	720.00	1,440.92
Third "Conto Energia" : photovoltaic (decree 6 august 2010)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 8000 MW is reached (art.3 comma 1)	0.00	1,015.92	2,286.00
<b>WAM SCENARIO –Planned Measures</b>				
National Action Plan for Renewable Energy 2010 (NAP) - Further measures	Measures to get the target of 98,885 TWh at 2020 - NAP 2010	345.18	1,021.62	5,979.70
Directive 2009/28/EC art 4.3	RES import from other states	0.00	0.00	4,896.00
Supporting energy efficiency in electricity – smart grid	Measures under the NAP 2010 reducing energy losses through the modernization of the national electricity transmission grid and of the distribution grid	0.00	0.00	711.63

Source: ENEA



### 2.4.1.2 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 (see 2.3.1.2) 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.

As regards new measures still at the planning stage, the competent Ministries are currently working on a new decree to extend the energy efficiency targets to 2020 and further support the diffusion of cogeneration plants and district heating systems, but the details of the new support scheme still have to be defined.

The expected emission reductions from RES cogeneration plants have been reported partly in the Energy Supply–Renewables sector and partly in Energy Supply–Cogeneration sector because benefit came from the Green Certificates system (for the production of electricity) and from the White Certificate system (for the energy saving effects).

In the Table 5 are reported impacts of policies and measures modelled in the WEM scenario and a planned measures included in the WAM scenario.

**Table 5** – Summary of policies and measures in the energy sector – Cogeneration

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Gg CO <sub>2</sub> eq.)		
		2010	2015	2020
<b>WEM SCENARIO –Implemented Measures</b>				
White certificates - decree december 2007	Supporting CHP plants for 2008-2012	691.32	967.85	967.85
National Strategic Framework 2007-2013 - FESR	Supporting CHP plants and district heating with POR and POIN	33.65	202.44	236.09
Action Plan July 2007 (White certificates 2012 -2016)	Supporting energy savings	0.00	1,198.66	2,465.71
<b>WAM SCENARIO – Planned Measures</b>				

Action Plan July 2007 (White certificates 2012 -2016) - supporting - New incentive system for district heating and energy integrated systems	(White certificates 2012 -2016) - further supporting - New incentive system for district heating and energy integrated systems	Supporting cogeneration - Incentive scheme for heat delivered to the user, as a tax deduction to the end user benefits - NAP - RES 2010	- Incentive benefits -	0.00	0.00	545.67
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Sources : ENEA

### 2.4.1.3 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 CO<sub>2</sub> 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.

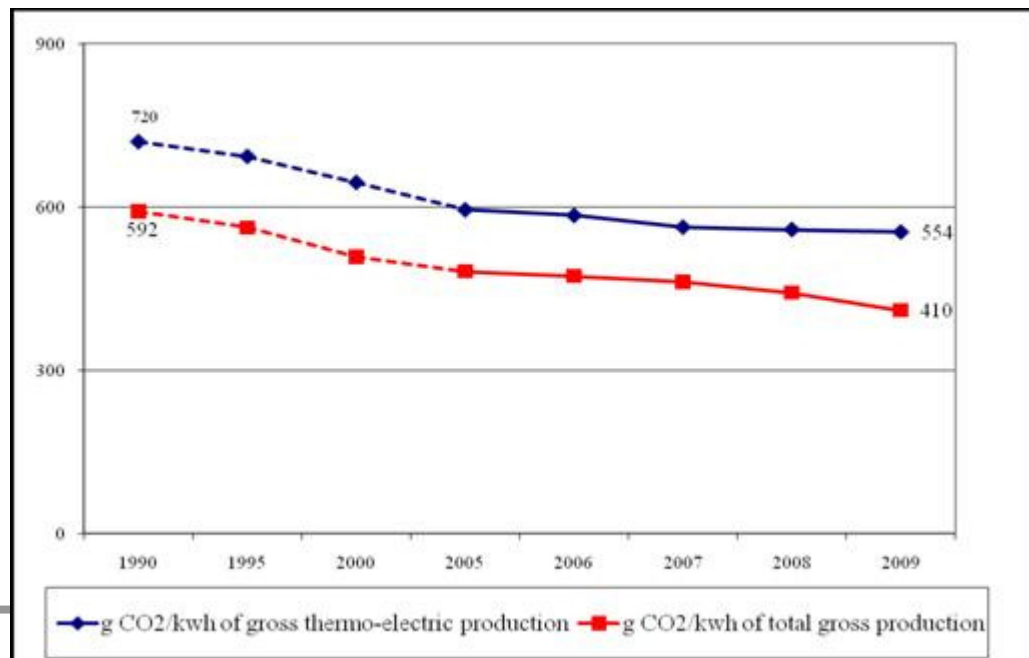
Law 239 of 23 August 2004 introduced some important changes in the energy sector. One of its main purposes was to speed up the authorization process for the construction of new power plants and energy infrastructures, particularly grid lines.

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 720 g/kWh in 1990 to 554 g/kWh in 2009.

**Figure 1** - Emission factors of gross production



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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.

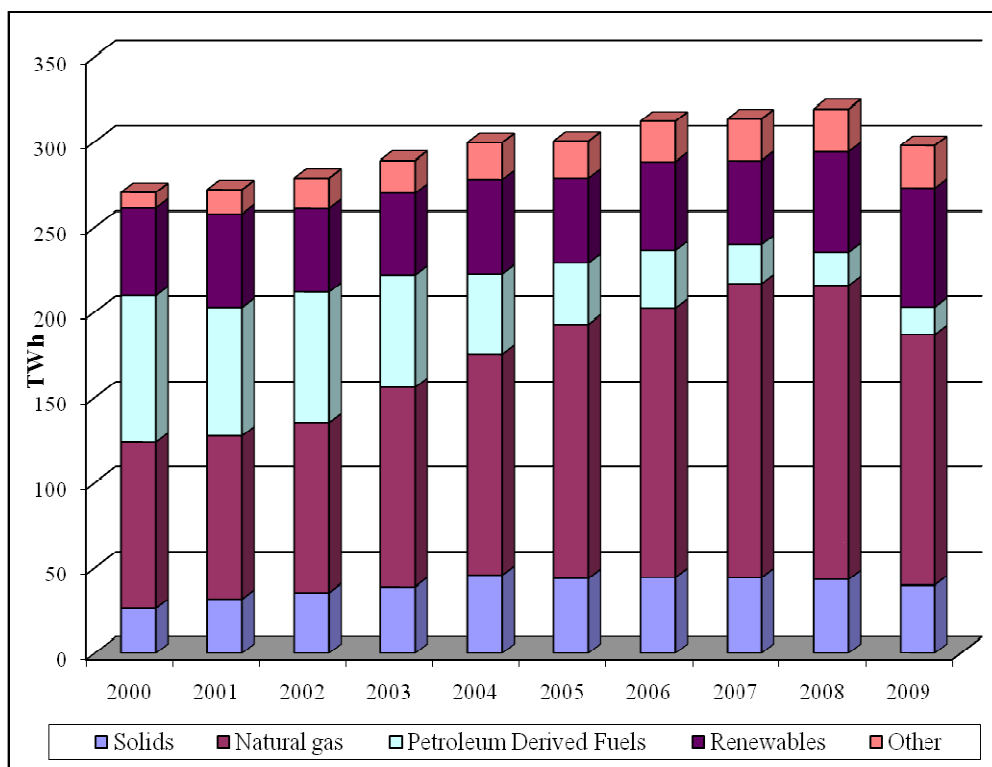
From 2000 to 2009 in Italy there was increased use of natural gas and a decrease of petroleum derived fuels use. Other energy sources are quite stable, see Figure 2.

Regarding the period after 2009, one sizeable (1800 MWe) new coal power plants has entered in service in 2010 ( Civitavecchia ) and another one (Porto Tolle) is expected 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.

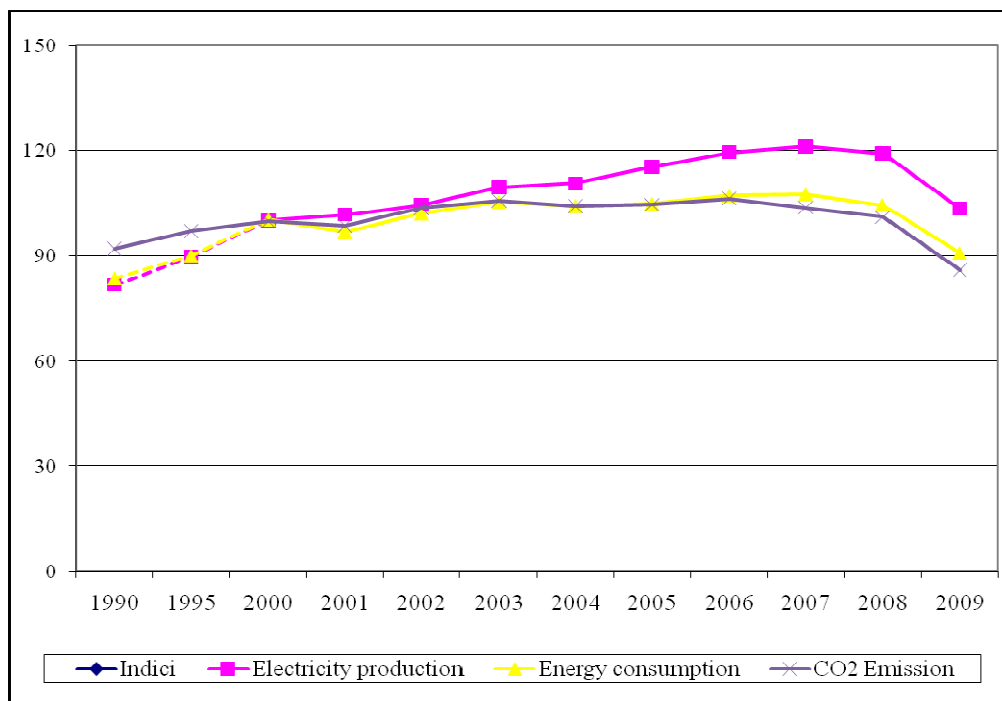
All measures are included in WEM scenario.

**Figure 2 - Electricity production (TWh) by energy source**



Source: ISPRA elaboration of TERNA data

**Figure 3 - Electricity production, energy consumption and CO2 emissions in the Thermolectric sector (index numbers)**



Source: ISPRA elaboration of TERNA data

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#### 2.4.1.4 *Energy efficiency in industry*

Policies affecting CO<sub>2</sub> 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 CO<sub>2</sub> 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.

Two more options currently under discussion concern the introduction of mandatory energy efficiency standards for machinery and the obligation to install highly efficient electric motors, inverters, etc when replacing the existing ones. This policies and measure have been also considered as planned measure.

**Table 6 - Summary of policies and measures in the industry sector**

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Gg CO <sub>2</sub> eq.)		
		2010	2015	2020
<b>WEM SCENARIO – Implemented Measures</b>				
White certificates - decree december 2007	Supporting electric energy savings for 2008-2012	637.55	1,817.02	2,018.91
Legislative decree 201/07 (transposition of directive 2005/32/EC- first regulations)	Installation of highly efficient electric motors and inverters through minimum mandatory standards	0.00	536.71	1,916.81
National Strategic Framework 2007-2013 - FESR	Supporting energy savings with POR and POIN	39.87	239.84	279.71
Action Plan July 2007 (White certificates 2012 -2016)	Supporting Energy savings	0.00	1,864.84	2,762.73
<b>WAM SCENARIO – Planned Measures</b>				
Further extend of energy saving targets (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)	0.00	0.00	1,434.49
Legislative decree 201/07 (transposition of directive 2005/32/EC) - further regulations	Eco-design and introduction of new mandatory energy efficiency standards for machinery (electric motors, inverters, etc) - implementation of measures of 2010 NAP	0.00	0.00	1,242.01
Action Plan July 2007 (extend to 2020); to promote and to support measures envisaged into NAP 2010	Steam mechanical compression, energy saving in glass, paper and chemical industries and heat recovery in industrial processes as reported into NAP 2010	0.00	0.00	4,192.38

Source: ENEA

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## 2.5 Sectors under the Effort Sharing Decision (ESD)

The commitment of the EU Climate Energy Package includes a 20% reduction of GHG emissions in 2020 compared to 1990 which equates to a reduction of 14% compared to 2005 emissions. This reduction was divided into two main emission sectors:

- ETS (Emission Trading Scheme);
- ESD (Effort Sharing Decision).

Under the ESD 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:

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

- AEA : Annual Emissions Allocation
- Y: year

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.

### 2.5.1 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.

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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 renovation<sup>4</sup> 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 m<sup>2</sup>);
- 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 1000m<sup>2</sup>;

The Budget laws 2007-2010 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).

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.

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<sup>4</sup> 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 m<sup>2</sup> and in case of expansion of existing buildings (over 20%). The decree applies only partially to existing buildings under the 1000m<sup>2</sup> threshold.



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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 7 - Summary of policies and measures in the civil (residential and tertiary) sector**

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction ( Gg CO2 eq.)		
		2010	2015	2020
<b>WEM SCENARIO –Implemented Measures</b>				
Building (Legislative decree 192/05 as amended by legislative decree 311/06)	Regulation Minimum mandatory standards on new and existing buildings (Energy Efficiency)	68.15	1,107.47	2,310.55
Building (Legislative decree 192/05 as amended by legislative decree 311/06)	Regulation Minimum mandatory standards on new and existing buildings (RES)	7.57	123.05	256.73
Budget law 2007 and budget law 2008	Supporting of energy saving in existing buildings through tax deduction of 55%	610.59	610.59	610.59
Budget law 2009	Supporting of energy saving in existing buildings through tax deduction of 55%	435.59	435.59	435.59
White certificates - decree December 2007	Supporting of energy saving 2008-2012 (Energy Efficiency)	1,331.37	3,301.39	3,119.68
White certificates - decree December 2007	Supporting of energy saving 2008-2012 (RES)	147.93	366.82	346.63
Legislative decree 201/07 (transposition of directive 2005/32/EC- first regulations )	First regulation on mandatory energy efficiency standards for energy-using products	86.63	866.30	2,598.90
National Strategic Framework 2007-2013 - FESR	Supporting energy savings with POR and POIN	60.35	363.06	423.41
Action Plan July 2007 (White certificates 2012 -2016)	Supporting energy savings (Energy Efficiency)	0.00	3,228.27	3,892.54
Action Plan July 2007 (White certificates 2012 -2016)	Supporting Energy savings (RES)	0.00	358.70	432.50
<b>WAM SCENARIO –Planned Measures</b>				
National Action Plan for Renewable Energy 2010 - Further measures	Measures to achieve the target of Termich RES	0.00	6,841.58	16,272.03
Further incentive (White certificates 2016-2020)	NAP - RES 2010 - Supporting energy savings (efficient lighting systems, replacement of electric heating systems, replacement of old boilers with more efficient one, external insulation in buildings)	0.00	0.00	5,112.76
Additional incentives	Economic incentives (financial, regional, etc.). to support the introduction of new equipment also in compliance with the NAP 2010	0.00	0.00	1,567.96

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction ( Gg CO2 eq.)		
		2010	2015	2020
Legislative decree 201/07 (transposition of directive 2005/32/EC) - further regulations	Eco-design and introduction of mandatory energy efficiency standards for machinery (appliances, boilers, etc.) - NAP 2010	0.00	0.00	1,567.96
Directive 2010/31/EC - New standards for efficiency in buildings	Further energy saving and promotion of renewable energy in buildings	0.00	371.43	5,114.18

Source: ENEA

## 2.5.2 *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, completion of mass rapid transport networks in urban areas. Management measures regarding enhancement of road urban public transport network, have been considered implemented policies and measure.
- 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 CO<sub>2</sub>/km (130 gCO<sub>2</sub>/km engines efficiency plus -10 gCO<sub>2</sub>/km from additional reduction tools);

**Table 8 - Most recent Italian subsidy to change old cars with new ones**

	Without discarding	With discarding (EU 0,1,2 up to 1999)	Total
<i>Using natural gas as fuel, electric or hybrid:</i>			
With CO <sub>2</sub> emissions less than 120 g/km	3,500 €	1,500 €	= 5.000 €
With CO <sub>2</sub> emissions more than 120 g/km	1,500 €	1,500 €	= 3.000 €
<i>Using LPG as fuel</i>			
	1,500 (+ 500 € Budget Law 2008)	1,500 €	=3.500 €
<i>Gasoline fuel:</i>			
With CO <sub>2</sub> emissions less than 140 g/km	0	1,500 €	= 1.500 €
<i>Diesel fuel:</i>			
With CO <sub>2</sub> emissions less than 130 g/km	0	1,500 €	=1.500 €

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.

New measures regarding the objective to reach a share of 6% of petrol and diesel road consumption by 2020 are under definition.

Part of this target is included in the WEM scenario and the additional measures considered for the compliances to 2020 target are regarded as planned

**Table 9 - Summary of policies and measures in the transport sector**

Name of PAM				Target and/or activity affected	TOTAL GHG Reduction (Gg CO <sub>2</sub> eq.)		
					2010	2015	2020
<b>WEM SCENARIO –Implemented Measures</b>							
Legislative (transposition 2003/30/EC)	decree of	128/05 directive	Mandatory use bio fuels (target 4.5% to 2012)	811.00	1,204.10	1,204.10	
Infrastructural measures			Completion of High Capacity and High Speed networks and tuning of regional networks for commuting and goods. Completion of mass rapid transport networks	0.00	3,750.00	5,700.00	
Emission standard for new car (Regulation (EC) No 443/2009)			Fleet update 130 g CO <sub>2</sub> /km	1,000.00	5,400.00	10,200.00	
Directive 2009/28/EC			Supporting use of bio fuels (target 10 %)	0.00	591.60	1,577.60	
National Strategic Framework 2007-2013 - FESR			Intermodal infrastructure projects: metropolitan railways	0.00	320.00	1,278.00	
<b>WAM SCENARIO –Planned Measures</b>							
Measures related to demand and behavior			To promote measures on technological, behavioral, and legislative aspects - NAP - RES 2010	0.00	0.00	2,900.00	
Intermodal measures to be funded			NAP - RES 2010 - Promotion of measures (infrastructure, intermodal and public mobility with electrical transport)	0.00	1,166.67	3,500.00	
Measures and incentive and new CO <sub>2</sub> target more stringent than those indicated into Regulation (EC) No 443/2009 and proposed regulation COM(2009) 593/3			NAP - RES 2010 - introduction of electric cars, saving of petrol / diesel and faster fleet update of cars and light commercial vehicles with new ones	0.00	0.00	9,865.16	

Source : ENEA

### 2.5.3 Industrial processes sectors

For the industrial processes sector has been taken into account the reduction of N<sub>2</sub>O 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 kgN<sub>2</sub>O/tHNO<sub>3</sub>). 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 10** – Summary of policies and measures in the industrial processes sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Gg CO <sub>2</sub> eq.)		
		2010	2015	2020
<b>WEM SCENARIO –Implemented Measures</b>				
Nitric acid	Reduction of N <sub>2</sub> O emissions in nitric acid production plants	650	690	740

Source: ISPRA

### 2.5.4 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 CAP<sup>5</sup> 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 16<sup>th</sup> 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 the reduction of methane emission are concentrated in two animal categories: cattle and swine. Also this measure is in WEM scenario.

**Table 11** – Summary of policies and measures in the agriculture sector

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Gg CO <sub>2</sub> eq.)		
		2010	2015	2020

<sup>5</sup> Common Agriculture Policy

<b>WEM SCENARIO – Measures Implemented</b>				
Nitrogen fertilizer	Rationalization in the use of nitrogen fertilizer	150	470	790
Animal storage	Recovery of biogas from animal storage system	220	300	400

Source: ISPRA

### 2.5.5 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.

In Table 12 are summarized emissions reduction from measures proposed.

**Table 12 - Summary of policies and measures in the waste sector**

Name of PAM	Target and/or activity affected	TOTAL GHG Reduction (Gg CO <sub>2</sub> eq.)		
		2010	2015	2020
<b>WEM SCENARIO – Measures Implemented</b>				
Separate collection	Compliance with separate collection targets and reduction of biodegradable waste disposed into landfills	1,200	2,700	3,700

Source: ISPRA

## 2.6 Forestry

### 2.6.1 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.

Total forest area, in 2009, was equal to 8,851,840 ha, 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 1985-2009.

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

**Table 13** - Amount of public and private forest land

FRA 2010 Categories <sup>6</sup>	Forest area (1000 hectares)			
	1990	2000	2005	2010
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
<b>TOTAL</b>	<b>7,590</b>	<b>8,369</b>	<b>8,759</b>	<b>9,149</b>

### 2.6.2 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 MtCO<sub>2</sub>) per year, or to 13.9 Mt C (50.97 MtCO<sub>2</sub>) 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. Therefore Italy's forest area is the total eligible area 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.

#### 2.6.2.1 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:

<sup>6</sup> FAO FRA 2010, Italy Country report: <http://www.fao.org/docrep/013/al537E/al537E.pdf>

- 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 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 19/CMP.17, 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 these transitions are essentially due to political decisions under the EEC Regulations 2080/92 and 1257/99 (art.10.1 and 31.1), therefore induced by man.

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).

#### 2.6.2.2 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 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.

#### 2.6.3 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-est<sup>8</sup>, is used to assess data

<sup>7</sup> "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.

<sup>8</sup> 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/iforest/>



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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).

Concerning carbon stock changes resulting from *deforestation* activities, for the current submission no detailed information was available 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; consequently, 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.

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.

#### **2.6.4 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. *Forest management and afforestation and reforestation* activities shall be tracked and certified by the National Registry for forest carbon sinks in order to be accountable.

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, see Annex 10) 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 has been put in place and is expected to supply data useful to update and improve the estimations. Moreover data on the last phase of national forest inventory, covering litter and soils pools, at NUT2 level, will be released in 2011, allowing Italy to report estimates of emissions and removals from litter and soils pools with a lower uncertainty.

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## 3 PROJECTIONS

### 3.1 Description of methodologies, models

The scenarios of greenhouse gas emissions from the combustion of energy sources are drawn from the Markal – Italy model<sup>9</sup>, based on the well known Markal software<sup>10</sup>. The “with existing measures” scenario used for this submission is an update of the latest reviewed output of the model available, published by ENEA in 2007 in its “Rapporto Energia e Ambiente – 2007, analisi e scenari”<sup>11</sup>. Briefly, the update include the use of 2009 final data and 2010 preliminary energy consumption data as an additional input to the model. It include also modifications of final demand that considers the effects of the ongoing economic downturn and a few years of low economic growth. The Italian industrial system is strongly export oriented and very sensitive to the changes in international trade. Finally the update uses the international energy prices recommended by EU Commissions for 2011 Member States submissions under Decision No. 280/2004/EC.

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. For instance the industrial sector is split in the following sub sectors: iron and steel, non ferrous, bricks and tiles, chemical, paper, mechanical, textile, building, and others. The demand for space heating is expressed in square meters of new or existing households, single or multi-family, with central heating or small apartment boilers, at different level of insulation. Demand and supply curves of each commodity are specified stepwise by set of technologies, for a total of over one thousand. Import and export options are include in most demand / supply curves. Emissions of CO<sub>2</sub> are directly accounted for in the model using IPCC “reference approach” methodology and national Emission Factors.

The basic year of the model is 2004, the latest update use also 2008 as an additional base year, modeled years go up to 2050. 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 “distribute” the electricity and the fuels that are needed for final consumption, starting from primary sources. This approach avoid 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]. Below some additional details are reported for two important sectors from the GHG emission trend point of view:

- **Transport: modeling** is based on detailed demand growth, which accounts for both goods and passenger transport. All modes are included, road, railway, air and water. With regard to road, the modeling of the Italian car fleet (petrol, diesel, gas-powered cars), heavy vehicles and busses is provided. The analysis also considers such variables as passengers-km, tons-km, mileage, occupancy rates and unit consumptions (liters-km).

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<sup>9</sup> The model has been first developed in the early nineties to evaluate GHG emissions reduction potential and costs . It has been used to prepare scenarios to evaluate mitigation policies in the first, second and fourth national communications to the UNFCCC. Model outputs have been used, inter alia, for preparing energy input scenarios to be used by Rains – Gains Italy model [[http://www.minni.org/rains/english\\_version.htm](http://www.minni.org/rains/english_version.htm), <http://www.iiasa.ac.at>] for National Emission Ceiling directive update and CAFE program and for preparing national detail for IEA ETP 2008.

<sup>10</sup> 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.

<sup>11</sup> <http://www.enea.it/>

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- Energy supply : the technologies represent all fossil fuels power plants in operation in 2009 . In the following periods, when existing power plants gradually go out of service, the growing demand is met by copies of the main existing technologies or more efficient combined cycles, integrated coal gasification, fluid bed cycles, fuel cells, CHP plants or renewable power plants (geothermal, wind, PV, hydro run of the river, mini hydro, solid waste, biogas and biomass). CO<sub>2</sub> sequestration and nuclear power plants are modeled, but both options become operative after 2020 in “with existing measure scenario”.

## 3.2 Description of scenarios

The scenario implanted in the model has been elaborated by a joint working group composed by members 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. As briefly summarized in previous paragraph the scenario described in this chapter derived from updating and improving of the scenario presented in the V NC and used for the 2009 submission to EU under Decision 280§/2004. The main differences between the previous and the actual WEM scenarios are the following:

- upgrade model input with final energy consumption of 2009 and preliminary data for 2010, adoption of 2008 as a second base year for the model together with 2004;
- upgrade of international energy prices and of carbon prices (for installations subject to ETS) on the basis of the values proposed by EU Commissions for 2011 Member States submissions under Decision No. 280/2004/EC
- improving of the modeling of the service and industrial sectors (non energy intensive industry), representation in model output of sectors included and excluded from EU ETS
- further expansion of model technological options, including CCS, hydrogen as an energy vector, nuclear reactors, advanced energy efficiency options for final consumption, on the basis of an harmonized technology set of the IEA ETP exercise;
- improvement of renewable energy options available in the model, in particular for the electricity production; we underline that the implemented measures (included in the “with existing measure scenario”) do not reach the EU climate package objective for renewables. A set of additional measures to this scope is actually under discussion at national and local level, including additional wind, solar and biomass use. These measures are included in the “with additional measures scenario”.
- modifications of the demand of energy intensive materials and energy services (in particular good transport sector) to take into account actual production and demand in 2010;
- revision of growth between 2010 and 2015 to account for the expected period of low economic development;

The growth trend is based on continuation of average trends in the Italian economy and energy consumption. It comes in particular from certain assumptions relating to social, demographic and economic circumstances of the country, assumptions used to determine the evolution of the demand for energy services, which is the basis of the scenarios. The main variables guiding for projections of demand for energy services, in the end-use sectors, are:

- for industry: economic growth (value added) and industrial production (at Sub sector level)
- for tertiary added value (of three major sub-sectors),
- for residential demographic trends of the system (primarily the population and the number of households), some assumptions on the expected evolution of demand characteristics, the expansion of number appliances per household and the growing demand for summer cooling

- for the transport dynamics active population (along with assumptions about mobility per capita) and the growth of national product (for transporting goods)

Another input to the model are the international energy prices. The actual development of demand for energy services is a result of the balance which is established on different energy markets, with the intersection curves of supply and demand of energy.

The main data used as input to the model are reported in Annex 2, below it is reported a brief discussion of main variables and the evolution in recent years.

### 3.2.1 Trends in international energy prices

The evolution trend of international energy prices is taken from a EU commission paper<sup>12</sup>. The proposed energy prices are reported in the following table. The prices used by the model are reported in Annex 2. The marginal differences between the two sets are due to the link with actual prices reported by national operators that considers national circumstances.

The deep modification in prices that have occurred in recent years are well represented by the historical set of prices used for national projections in recent years reported in the table below. The prices are also volatile.

The historical evolution of prices and their volatility add considerable uncertainty to this important model variable. The uncertainty is transferred to the scenario projections.

**Table 14 – International energy prices**

		2005	2010	2015	2020
<b>2011 Template / Actual developments</b>					
International coal prices	€ / GJ	2.02	4.25	4.45	5.31
International oil prices	€ 2005/ bbl	48.32	76	77.6	87.4
International gas prices	€ / GJ	4.88	8.15	8.38	9.61
<b>2009 Template submission / V NC</b>					
International coal prices	€ / GJ	2.02	1.67	1.4	1.17
International oil prices	€ 2005/ bbl	48.32	49.86	52.9	55.0
International gas prices	€ / GJ	4.88	5.17	5.4	5.56
<b>2007 Template submission / IV NC</b>					
International coal prices	€ / GJ	1.87	2.03	1.98	1.98
International oil prices	€ 2005/ bbl	48.32	47.76	47.74	49.50
International gas prices	€ / GJ	4.88	6.61	4.85	5.02

Notes: - as reported in paragraph 5.9 energy prices are identical for the sensitivity analysis scenario and “with measure scenario”  
 - NC, national communication to UNFCCC

### 3.2.2 Technologies for electricity generation

The choice of electric generation technologies is driven by the minimization of costs, but also taking into account the constraints of local environmental and / or national objectives (partially internalized in the model as additional costs). The new generating capacity built in the coming years will be made up primarily by the less expensive technology.

### 3.2.3 The economic system

The development trend of the system is based on the substantial continuation of recent trends. In the last two decades Italy has experienced low growth and less than the European average. The evolution trend adopts the vision that the country must come to terms with some of its "specific delays and ambiguity"<sup>13</sup>, which "cannot grow beyond the modest levels ", so that the growth is about 1,5% in real terms.

<sup>12</sup> “Other information/recommendations relevant for MS reporting under art. 3.2 of MMD in 2011”

<sup>13</sup> Confindustria, Previsioni macroeconomiche, 2004, Editore SIPI Srl

Among the factors that motivate this "prudent" vision, in particular with regard to the industrial sector, there is above all the rigidity of the Italian model of specialization, characterized by a low average size of company and by the continuation of the difficulties and the competitive disadvantage compared to high-tech sectors and in high economies of scale<sup>14</sup>. The other element of this "Italian anomaly" is the loss of competitiveness of the production system in recent years.

The economic downturn of 2009 has interested in particular the subsectors linked to construction that include steel production ("long products"), cement, lime, bricks, tiles and glass production. Moreover in those sectors production has remained at low levels also in 2010 and a low growth is expected for some years. The above changes in economic structure have been included in the model.

**Table 15 – GDP**

	1990	1995	2000	2005	2008	2009	2010
<i>2007 Template submission / IV NC</i>							
mln EUR95	866555.2	923052.2	1015077	1053361	1107959		1147778
yearly growth rates		1.30%	1.90%	3.80%	5.20%		1.80%
<i>2009 Template submission / V NC</i>							
mln EUR 2005	1172723	1249190	1372852	1417241	1480391		1530439
yearly growth rates		1.30%	1.90%	3.20%	4.50%		1.70%
<i>2011 Template / Actual developments</i>							
mln EUR 2005	1168281	1244458	1367334	1429010	1460026	1383570	1400850
yearly growth rates		1.30%	1.90%	4.50%	2.20%	-5.20%	1.20%

Note: chained values are used for GDP expressed in EUR 2005

### 3.2.4 Population and transport

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 number of families is constantly increasing through the period due to the reduction of persons per family. Demographic trends limits the growth in demand for energy services in the residential sector and also limits the growth of mobility of passengers due to ageing population, especially in the long term.

**Table 16 – Population**

	1990	2000	2005	2008	2010	2015	2020
2007 Template submission / IV NC	56,953	57,844	58,462	58,475	58,531	58,471	58,123
2009 Template submission / V NC	56,694	56,929	58,462	59,619	60,190	61,130	61,160
2011 Template / Actual developments	56,694	56,929	58,457	60,045	60,464	61,130	61,160

The passenger transport is based on the dynamics of active population (along with assumptions about mobility per capita) and the goods transport is linked to the growth of GDP.

The modal split of transport sector does not change in significant way in the "with existing measures scenario". From 2010 to 2020 the demand for transport services is growing in all modes: road, rail, ship and air. The sharp reduction of goods transport in 2009 has been taken into account in growth estimates.

<sup>14</sup> ENEA, L'Italia nella competizione tecnologica internazionale, Quinto rapporto, Sintesi e scenari generali, 2006; Centro Europa Ricerche, Crisi delle esportazioni: quello che la lira ci aveva nascosto, Rapporto CER 4/2004; Confindustria, Tendenze dell'industria italiana, 2004, Editore SIPI Srl, Roma.

**Table 17 – Transport**

	1990	1995	2000	2005	2010	2015	2020
<b>Passengers, Gp-km</b>							
Actual, with time series updates	728	824	957	938	993	1013	1045
<i>yearly growth rates</i>		2.50%	3.04%	-0.40%	1.15%	0.41%	0.63%
V-NC	728	824	850	890	930	967	1005
<i>yearly growth rates</i>		2.50%	0.63%	0.92%	0.89%	0.77%	0.78%
2007 Template submission / IV NC	727	823	850	890	928	960	990
<i>yearly growth rates</i>		2.50%	0.65%	0.92%	0.84%	0.68%	0.62%
TCN	727	828	896	976	1064	1124	1187
<i>yearly growth rates</i>		2.62%	1.59%	1.73%	1.74%	1.11%	1.10%
<b>Goods, Gt-km, &gt; 50 km</b>							
actual, > 50 km	191	207	216	240	189	198	209
<i>yearly growth rates</i>		1.59%	0.84%	2.10%	-4.63%	0.97%	1.03%
2009 Template submission / V NC, >3.5 t	226	255	302	336	363	396	435
<i>yearly growth rates</i>		2.46%	3.49%	2.13%	1.56%	1.76%	1.90%
2007 Template submission / IV NC	190	213	249	263	279	311	338
<i>yearly growth rates</i>		2.35%	3.17%	1.10%	1.19%	2.20%	1.68%
TCN	190	206	228	250	274	295	318
<i>yearly growth rates</i>		1.70%	2.06%	1.83%	1.82%	1.51%	1.51%

### 3.2.5 Consumption of primary energy

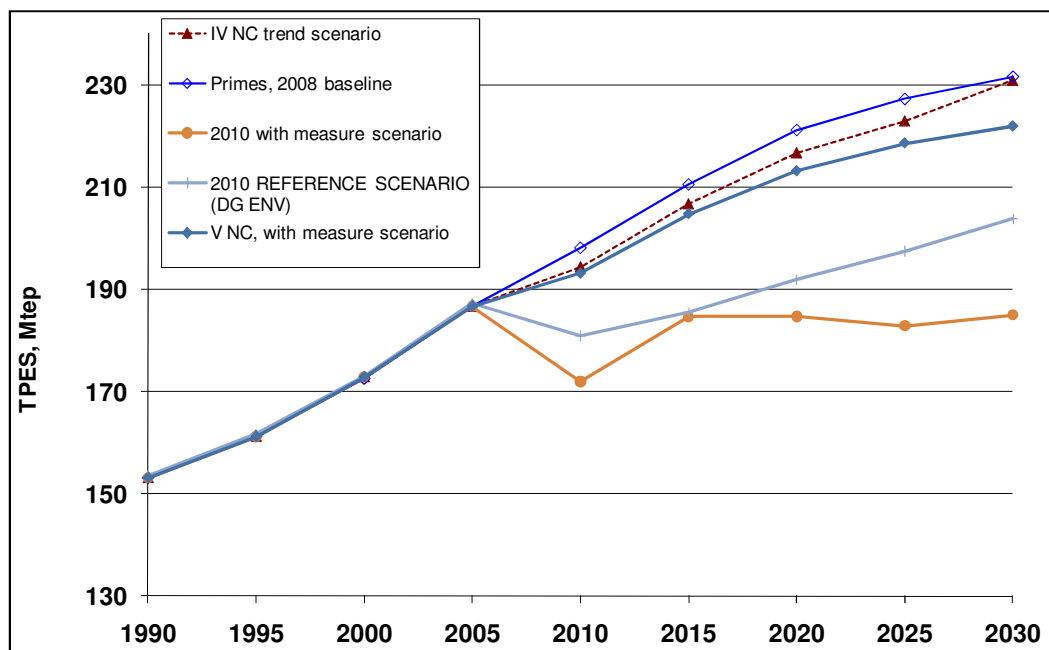
The total primary energy supply (TPES) in 2020, estimated according to Eurostat methodology, will be about 185 Mtoe, with an average yearly growth rate of 0.7%. The average growth rate in 2000-2008 was 0.6%, a decrease of 8% was observed between 2008 and 2009. In 2020 the total primary energy consumption will be lower than 2005 by about 2 Mtoe. The weight of natural gas will exceed the oil one in the next decade.

With reference to Figure 4 there are relevant changes in the estimated total energy consumption between the updated 2010 scenario (reported hereinafter in the figures as “2010 with measure scenario”) and the previous ones, identified as “IV NC” and V NC, due to the ongoing economic crisis. The results are also lower than the EU scenarios from Primes model<sup>15</sup>.

In Annex 2 are reported the mandatory parameters on projection of energy consumption.

<sup>15</sup> Model based Analysis of the 2008 EU Policy Package on Climate Change and Renewables

**Figure 4 - Projection of gross inland consumption, Mtoe**



Note: energy consumption estimated according to Eurostat methodology

### 3.3 Emissions of greenhouse gases

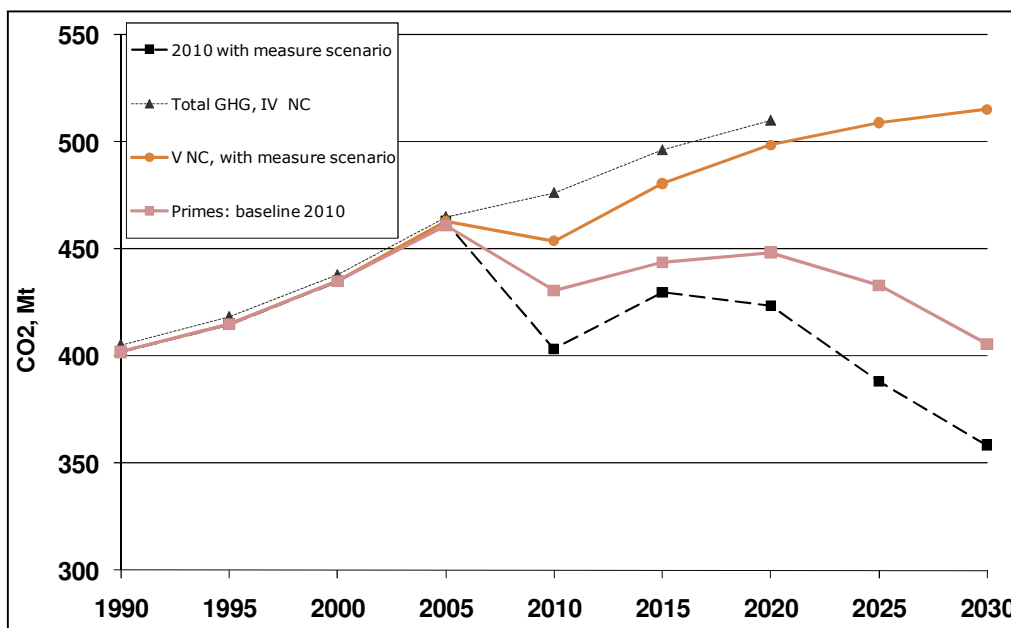
#### 3.3.1 Energy CO<sub>2</sub> emissions

Based on above mentioned scenarios the model computes directly the CO<sub>2</sub> 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 2009 are final data, 2010 is preliminary., 2015 - 2020 are a model estimates.

As can be seen in the Figure 5 final results shows a remarkable reduction in emissions in 2010, and then an increase following a similar pattern to the previous estimates. 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, of which the increase in biomass – waste use is structural while the hydroelectric production increase is due to historically high rain levels
- 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

**Figure 5 - Actual and projected net 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 higher increase is in the energy sector, 2010 – 2020 +13.6% ; 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 outpace the efficiency improvements; 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, from 24% (2005) to 27% (2020) of gross production.; the expansion renewable production to meet EU objective will reduce the emissions increase; it has to be underlined that the further energy related emission reduction after 2020 is due to this sub sector through the planned implementation of CCS and nuclear energy;
- an increase is also registered in transport sector, , 2010 – 2020 +3.1% ; 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; the reduced increase in projection years is linked to a reduced demand growth and to the effect of the ongoing policies to increase efficiency of cars (EU regulation on cars CO2) , further expansion of low GHG emitting fuels (objective of 10% of biofuels in transport sectors), planned natural gas expansion.
- civil sector, was increasing in historical years, 2000 – 2010 +13.5% and is projected nearly stable in projection years 2010 – 2020 -1.2% ; 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 significative effect and are successful in curbing emissions.
- industry emissions register a deep decrease in historical years, 2000 – 2010, -30%, and stay almost stable in projection years 2010 – 2020, -2% ; the past trend include the effect of economic crisis.

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 both 2004 and



2008, 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.

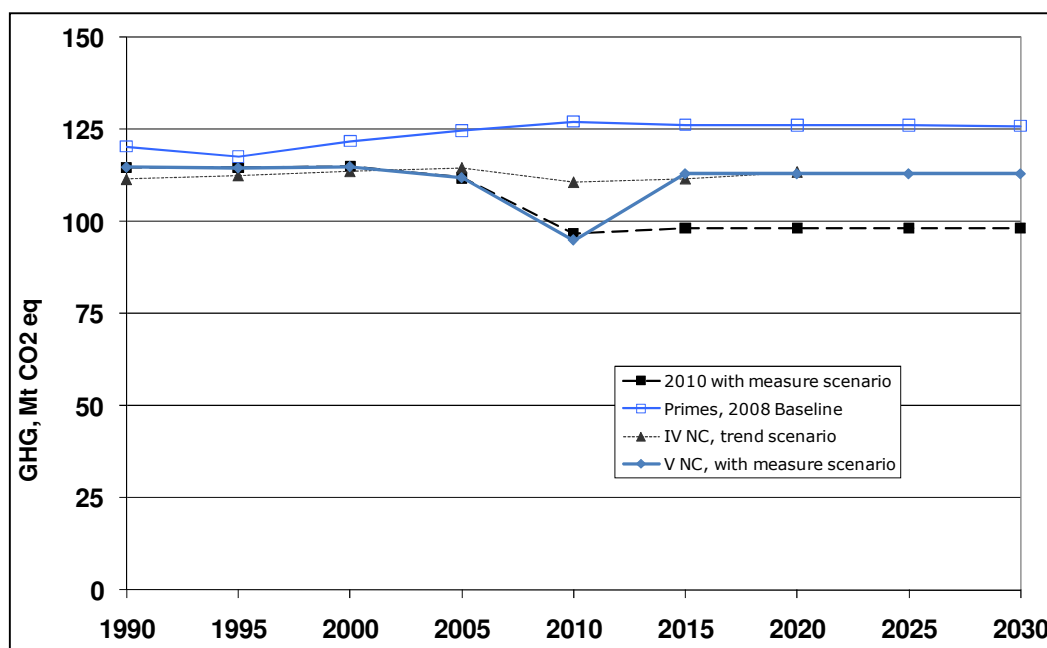
### 3.3.2 Other GHG emissions

In figure 6 the emissions of CO<sub>2</sub> 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 in 2010. The reduction is due to the effect of previously only planned measures that have been implemented and are now included in trend scenario, in the following in order of importance:

- implementation on N<sub>2</sub>O 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 increase from 2010 up to 2015 and then stay stable. The increase is mainly 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 sector the emissions continue to decline.

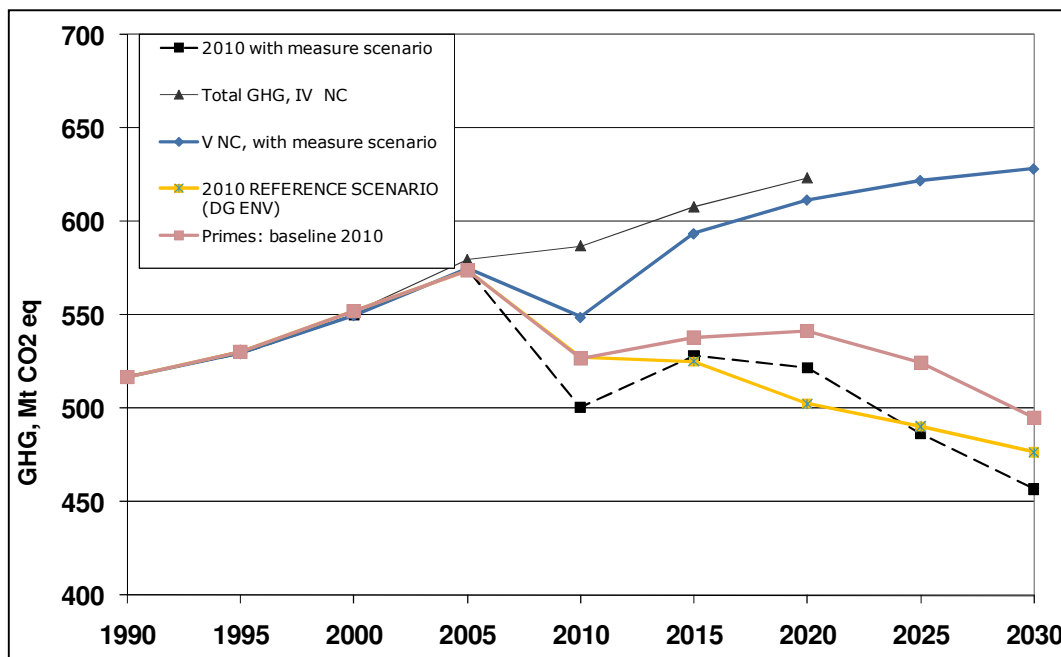
**Figure 6** - Actual and projected net GHG emissions , Mt CO<sub>2</sub> eq



### 3.3.3 Total emissions of greenhouse gases

The resulting trend in total GHG emissions is reported in the Figure 7. 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 7 - Actual and projected net GHG emissions , Mt CO<sub>2</sub> eq



### 3.4 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))<sup>16</sup> play a role in meeting its commitment under the Protocol and operators' commitments under Directive 2003/87/CE. The complementarity 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 MtCO<sub>2</sub>/year, the maximum quantity of CERs/ERUs to be used by operators under Directive 2003/87/CE is equal to 30.2 MtCO<sub>2</sub>/year. In order to respect the complementarity 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. The credits CERs and ERUs are mainly purchased through the Italian Carbon Fund (ICF), which was set up in 2003 following an agreement between the World Bank and the Italian Ministry for the Environment, Land and Sea. 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).

<sup>16</sup> Eligible projects in the energy and end use sectors 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.

### 3.5 Total effect of policies

The Table 18 and 19 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 3.1.

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 514.6 Mt CO<sub>2</sub> and the "gap" to achieve the Kyoto objective (483.3 MtCO<sub>2</sub>/year) is equal, on average, to 34,2 MtCO<sub>2</sub>/year (see Table 18).

The contribution of ETS sectors to meet the Kyoto Protocol target is 201.6 MtCO<sub>2</sub>/year (total yearly average quantity of allowances allocated for the second trading period). Please note that this value does not include emissions other than CO<sub>2</sub> (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 MtCO<sub>2</sub>/year.

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

- Carbon sinks : -10.2 MtCO<sub>2</sub>/yearly (preliminary estimates).
- Further purchase of CERs / ERUs (in respect of the complementarity principle)
- Purchase of AAUs

**Table 18** – 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	547.6	574.9	541.7	491.1	506.7	513.5	520.3
<i>ETS Sector (verified emissions/WEM scenario)</i>	207.6	213.1	220.1	226.0	220.7	184.9	190.1	194.2	198.2
<i>Non ETS sector</i>	308.9	317.1	327.5	348.9	321.1	306.3	316.6	319.3	322.1
<i>CERs/ERUs already bought by the Government</i>					1.1	1.1	1.1	1.1	1.1
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					281.7	281.7	281.7	281.7	281.7
<i>Non ETS sector (WEM scenario - CERs/ERUs use )</i>	308.9	317.1	327.5	348.9	320.0	305.2	315.5	318.2	321.0
<i>Gap( non-ETS WEM scenario - AAU available for non ETS)</i>					38.3	23.5	33.8	36.5	39.3

Table 19 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.

All the data reported in table 19 are preliminary, pending the review and the formal adoption by the EU Commission

Under the ESD the emissions target for non-ETS sectors in year 2013 and 2020 is about 300.5 and 284.9 MtCO<sub>2</sub>eq respectively. . Considering the emissions according to the WEM scenario the "gap" to achieve those targets amount to 8.8 / 33.8 MtCO<sub>2</sub>eq in 2013 and 2020 respectively.

The mitigation options identified to "fill" the gap are reported in Annex 1 as “planned measures” and have a potential between 1.4 and 53.1 MtCO<sub>2</sub>eq, in 2013 and 2020

respectively. The total potential of the measures identified in Annex 1 is higher, about 64 Mt CO<sub>2</sub> 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, the quantity of credits to be used by the Government is about 14,6 Mt, 4% of the emissions occurred in 2005).

**Table 19** – 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	547.6	574.9	506.7	522.2	525.9	535.6
<i>ETS Sector (WEM scenario)</i>	207.6	213.1	220.1	226.0	190.1	199.6	202.2	203.2
<i>ETS Sectors (additional activities and gases)</i>				19.2	10	11.1	11.2	11.3
<i>Civil Aviation (include in ETS from 2012)</i>				2.2	2.2	2.3	2.3	2.4
<i>ETS sector 2013-2020 (WEM scenario + additional activities)</i>				247.4	202.3	212.9	215.7	216.9
Non ETS sector (WEM scenario) (ii)	308.9	317.1	327.5	327.5	304.4	309.3	310.2	318.7
<i>Effort sharing decision objective</i>						300.5	295.9	284.9
Gap						8.8	14.3	33.8
Planned P&M (electricity and heat), Annex I					0.4	3.1	9.4	64.9
Planned P&M in ESD sector (heat)					0.4	1.4	4.2	53.1
<i>Non ETS sector (WAM scenario)</i>				<u>327.5</u>	<u>303.3</u>	<u>307.9</u>	<u>306.0</u>	<u>265.6</u>
Gap						7.4	10.2	-19.3

Notes:

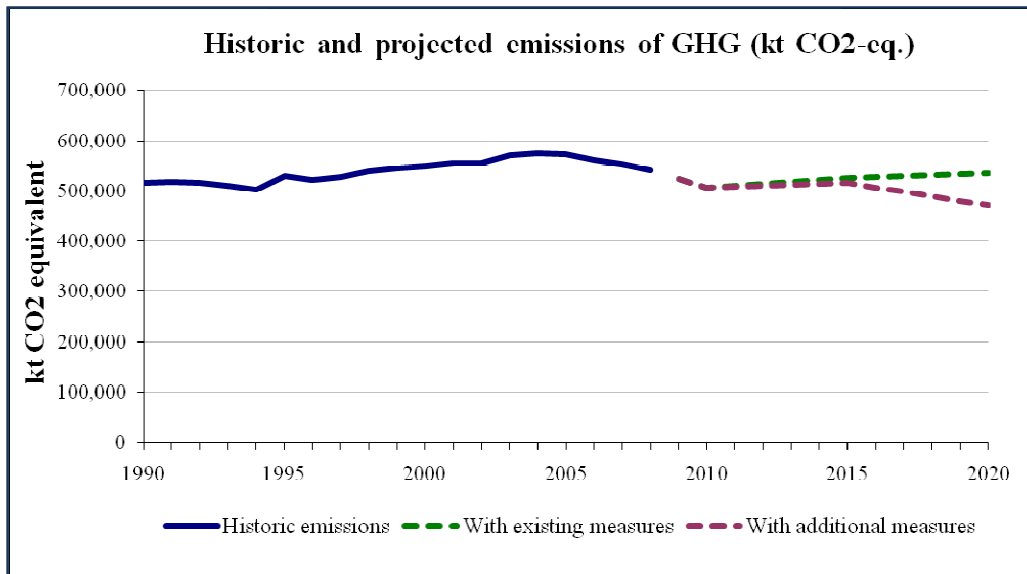
- i all data in the table are preliminary ISPRA estimates subject to EU Commission approval
- ii the data are different from table 18 because the division between ETS and non ETS follows different rules for post Kyoto period

Total effect of policies is summarized in Figure 8. Data up to 2009, blue line, are inventory data. The two dotted lines starting from 2010 show the emissions in WEM and WAM scenarios.

From a methodological point of view it is not correct to consider the total effects of the additional measures as the sum of the effects of each measure. The possibility of double counting of effects, rebound effect and other discrepancies can occur. An attempt has been made to estimate through the use of the model the total effect of the complete package of measures. The preliminary results of this test considers possible a reduction of emissions between half and 2/3 of the estimated total emissions reductions. The result is not due to mistake in the estimated potential reduction of the single measures but to the high level of ambition of some of them, that include the early retirement of existing stock of energy using devices (cars, dwellings, appliances). The model does not allow early retirement with the existing carbon and energy prices.

We underline that for the 2010 in table 19 has been included the effect of the emission allowances acquired by operators to comply with ETS cap. The allowances to be acquired in 2015 and 2020 cannot be estimated because the total EU cap has not yet been subdivided at country level.

**Figure 8 - Historical and projected emissions, kt CO<sub>2</sub> eq**



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## **4 Implementation of European legislation, institutional and legal arrangements**

### **4.1 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.

### **4.2 Legal and institutional steps to implement the emissions reductions commitments**

#### **4.2.1 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 CO<sub>2</sub> emissions by 2000 at 1990 level. Afterwards the program was enhanced and updated (CIPE deliberations of 1997 and 1998<sup>17</sup>) and in 2002, when the Kyoto Protocol was ratified<sup>18</sup>, 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.

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<sup>17</sup> See second national communication of Italy on climate change to the UNFCCC.

<sup>18</sup> 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.

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#### **4.2.2 *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.

#### **4.2.3 *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: biomass plants; solar thermal power plants; wind and photovoltaic power plants; waste and biogas fuelled power plants.

#### **4.2.4 *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.

#### **4.2.5 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 27<sup>th</sup> 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.

#### **4.2.6 National System for Monitoring Greenhouse Gases**

A Legislative Decree, issued on 27<sup>th</sup> 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 30<sup>th</sup> 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.



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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

N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the PAM	Effect of the PAM	Effect of the PAM
						Gg CO2 eq 2010	Gg CO2 eq 2015	Gg CO2 eq 2020
1	Third "Conto Energia" : photovoltaic (decree 6 august 2010)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 3000 MW is reached (art.3 paragraph 2)	Renewables	implemented	WEM	464.58	944.46	944.46
2	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	WEM	596.70	4,165.37	4,594.50
3	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	WEM	0.00	720.00	1,440.92
4	Third "Conto Energia" : photovoltaic (decree 6 august 2010)	Supporting the expansion of photovoltaic plants through feed in tariffs until a maximum capacity of 8000 MW is reached (art.3 comma 1)	Renewables	implemented	WEM	0.00	1,015.92	2,286.00
5	White certificates - decree December 2007	Supporting CHP plants for 2008-2012	Energy supply - Cogeneration	implemented	WEM	691.32	967.85	967.85

N PAM	Name of PAM		Objective	Sector	Status	Projections scenario	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq
							2010	2015	2020
6	European development (ERDF), Strategic Framework 2008-2013	regional fund National Framework	Supporting CHP plants and district heating with POR and POIN	Energy supply - Cogeneration	implemented	WEM	33.65	202.44	236.09
7	Action Plan July 2007 (White certificates 2012 - 2016)		Supporting energy savings	Energy supply - Cogeneration	implemented	WEM	0.00	1,198.66	2,465.71
8	White certificates - decree December 2007		Supporting electric energy savings for 2008-2012	Industry	implemented	WEM	637.55	1,817.02	2,018.91
9	Legislative decree 201/07 (transposition of directive 2005/32/EC- first regulations)	first	Installation of highly efficient electric motors and inverters through minimum mandatory standards	Industry	implemented	WEM	0.00	536.71	1,916.81
10	European development (ERDF), Strategic Framework 2008-2013	regional fund National Framework	Supporting energy savings with POR and POIN	Industry	implemented	WEM	94.00	565.50	659.50
11	Action Plan July 2007 (White certificates 2012 - 2016)		Supporting energy savings	Industry	implemented	WEM	0.00	1,864.84	2,762.73

N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the	Effect of the	Effect of the
						PAM Gg CO2 eq 2010	PAM Gg CO2 eq 2015	PAM Gg CO2 eq 2020
12	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	WEM	68.15	1,107.47	2,310.55
13	Building Regulation (Legislative decree 192/05 as amended by legislative decree 311/06)	Minimum mandatory standards on new and existing buildings (RES)	Civil sector	implemented	WEM	7.57	123.05	256.73
14	Budget law 2007 and budget law 2008	Supporting of energy saving in existing buildings through tax deduction of 55%	Civil sector	implemented	WEM	610.59	610.59	610.59
15	Budget law 2009	Supporting of energy saving in existing buildings through tax deduction of 55%	Civil sector	implemented	WEM	435.59	435.59	435.59
16	White certificates - decree December 2007	Supporting of energy saving 2008-2012 (Energy Efficiency)	Civil sector	implemented	WEM	1,331.37	3,301.39	3,119.68
17	White certificates - decree December 2008	Supporting of energy saving 2008-2012 (RES)	Civil sector	implemented	WEM	147.93	366.82	346.63

N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq
						2010	2015	2020
18	Legislative decree 201/07 (transposition of directive 2005/32/EC- first regulations )	First regulation on mandatory energy efficiency standards for energy-using products	Civil sector	implemented	WEM	86.63	866.30	2,598.90
19	National Strategic Framework 2007-2013 - ERDF	Supporting energy savings with POR and POIN	Civil sector	implemented	WEM	60.35	363.06	423.41
20	Action Plan July 2007 (White certificates 2012 - 2016)	Supporting energy savings (Energy Efficiency)	Civil sector	implemented	WEM	0.00	3,228.27	3,892.54
21	Action Plan July 2007 (White certificates 2012 - 2016)	Supporting energy savings (RES)	Civil sector	implemented	WEM	0.00	358.70	432.50
22	Legislative decree 128/05(transposition of directive 2003/30/EC)	Mandatory use bio fuels (target 4.5% to 2012)	Transport	implemented	WEM	811.00	1,204.10	1,204.10
23	Infrastructural measures	Completion of High Capacity and High Speed networks and tuning of regional networks for commuting and goods. Completion of mass rapid transport networks	Transport	implemented	WEM	0.00	3,750.00	5,700.00
24	Emission standard for new car (Regulation (EC) No 443/2009)	Fleet update 130 g CO2/km	Transport	implemented	WEM	1,000.00	5,400.00	10,200.00

N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq
						2010	2015	2020
25	Directive 2009/28/EC	Supporting use of bio fuels (target 10 %)	Transport	implemented	WEM	0.00	591.60	1,577.60
26	National Strategic Framework 2007-2013 - FESR	Intermodal infrastructure projects: metropolitan railways	Transport	implemented	WEM	0.00	320.00	1,278.00
27	Nitric acid	Reduction of N2O emissions in nitric acid production plants	Industrial Processes	implemented	WEM	650.00	690.00	740.00
28	Nitrogen fertilizer	Rationalization in the use of nitrogen fertilizer	Agriculture	implemented	WEM	150.00	470.00	790.00
29	Animal storage	Recovery of biogas from animal storage system	Agriculture	implemented	WEM	220.00	300.00	400.00
30	Separate collection	Compliance with separate collection targets and reduction of biodegradable waste disposed into landfills	Waste	implemented	WEM	1,200.00	2,700.00	3,700.00
31	National Action Plan for Renewable Energy 2010 (NAP) - Further measures	Measures to get the target of 98,885 TWh at 2020 - NAP 2010	Renewables	planned	WAM	345.18	1,021.62	5,979.70
32	Directive 2009/28/EC art 4.3	RES import from other states	Renewables	planned	WAM	0.00	0.00	4,896.00
33	National Action Plan for Renewable Energy 2010 - Further measures	Measures to achieve the target of Termic RES	Renewables	planned	WAM	0.00	6,841.58	16,272.03

N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq
						2010	2015	2020
34	Supporting energy efficiency in electricity	Measures under the NAP - RES 2010 reducing energy losses through the modernization of the national electricity transmission grid and of the distribution grid	Energy supply	planned	WAM	0.00	0.00	711.63
35	Action Plan July 2007 (White certificates 2012 - 2016) - further supporting - New incentive system for district heating and energy integrated systems	Supporting cogeneration - Incentive scheme for heat delivered to the user, as a tax deduction to the end user benefits - NAP - RES 2010	Energy supply - Cogeneration	planned	WAM	0.00	0.00	545.67
36	Further extend of energy saving targets (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)	Industry	planned	WAM	0.00	0.00	1,434.49

N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq	Effect of the PAM Gg CO2 eq
						2010	2015	2020
37	Legislative decree 201/07 (transposition of directive 2005/32/EC) - further regulations	Eco-design and introduction of new mandatory energy efficiency standards for machinery (electric motors, inverters, etc) - implementation of measures of 2010 NAP - RES	Industry	planned	WAM	0.00	0.00	1,242.01
38	Action Plan July 2007 (extend to 2020); to promote and to support measures envisaged into NAP - RES 2010	Steam mechanical compression, energy saving in glass, paper and chemical industries and heat recovery in industrial processes as reported into NAP - RES 2010	Industry	planned	WAM	0.00	0.00	4,192.38
39	Further incentive (White certificates 2016-2020)	NAP - RES 2010 - Supporting energy savings (efficient lighting systems, replacement of electric heating systems, replacement of old boilers with more efficient one, external insulation in buildings)	Civil sector	planned	WAM	0.00	0.00	5,112.76
40	Additional incentives	Economic incentives (financial, regional, etc.) to support the introduction of new equipment also in compliance with the NAP - RES 2010	Civil sector	planned	WAM	0.00	0.00	1,567.96



N PAM	Name of PAM	Objective	Sector	Status	Projections scenario	Effect of the	Effect of the	Effect of the
						PAM Gg CO2 eq 2010	PAM Gg CO2 eq 2015	PAM Gg CO2 eq 2020
41	Legislative decree 201/07 (transposition of directive 2005/32/EC) - further regulations	Eco-design and introduction of mandatory energy efficiency standards for machinery (appliances, boilers, etc.) - NAP - RES 2010	Civil sector	planned	WAM	0.00	0.00	1,567.96
42	Directive 2010/31/EC - New standards for efficiency in buildings	Further energy saving and promotion of renewable energy in buildings	Civil sector	planned	WAM	0.00	371.43	5,114.18
43	Measures related to demand and behavior	To promote measures on technological, behavioral, and legislative aspects - NAP - RES 2010	Transport	planned	WAM	0.00	0.00	2,900.00
44	Intermodal measures to be funded	NAP - RES 2010 - Promotion of measures (infrastructure, intermodal and public mobility with electrical transport)	Transport	planned	WAM	0.00	1,166.67	3,500.00
45	Measures and incentive and new CO2 target more stringent than those indicated into Regulation (EC) No 443/2009 and proposed regulation COM(2009) 593/3	NAP - RES 2010 - introduction of electric cars, saving of petrol / diesel and faster fleet update of cars and light commercial vehicles with new ones	Transport	planned	WAM	0.00	0.00	9,865.16
Total impact of planned measures						345.18	9,401.29	64,901.91

## Annex 2 Mandatory parameters on projections

### *General Economic Parameters*

		1990	1995	2000	2005	2010	2015	2020
Gross Domestic Product	Value mld 2005 basis (€)	1,173	1,249	1,373	1,429	1,401	1,490	1,589
Population	Thousand people	56,694	56,846	56,929	58,462	60,464	61,138	61,634
International coal price	€ per GJ				2,02	4.25	4.45	5.31
International oil price	€ per bbl				48,32	76	77.6	87.4
International gas price	€ per GJ				4,88	8.15	8.38	9.61

### *Assumptions for energy sector*

		1990	1995	2000	2005	2010	2015	2020
Total gross inland consumption	PJ	6,285	6,617	7,064	7,643	7,036	7,608	7,631
Electricity import	PJ	3762	3904	3724	3482	2,897	2,922	2,623
Oil	PJ	1633	1870	2426	2958	2,823	3,047	3,191
Gas	PJ	612	514	530	690	607	742	781
Coal	PJ	278	330	384	513	10	897	1,035
Renewables	PJ	6,48	12,12	16,27	20,17	23,70		

**Annex 3**  
**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 <sup>1</sup>
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 <sup>2</sup> and landfills	6
buildings	households, services excl. mobile equipment and off-road vehicles	3, 1A4a, 1A4b

<sup>1</sup>emissions due to flue gas desulphurization

<sup>2</sup>when 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 4 - Actual emissions by gas and sector. The figures are taken from the CRF 2011 submission.**

<b>GREENHOUSE GAS EMISSIONS</b>												
	<b>Base year (1990)</b>	<b>1995</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
CO <sub>2</sub> emissions including net CO <sub>2</sub> from LULUCF	373,817.42	365,996.63	384,685.49	382,647.61	379,061.33	404,010.20	402,552.06	399,534.16	388,429.91	402,699.03	373,125.56	322,480.95
CO <sub>2</sub> emissions excluding net CO <sub>2</sub> from LULUCF	435,894.77	445,959.30	463,669.78	469,618.50	471,927.30	487,700.31	490,565.47	490,118.99	485,428.13	476,226.04	466,004.25	417,212.41
CH <sub>4</sub> emissions including CH <sub>4</sub> from LULUCF	43,670.65	44,163.56	45,733.25	44,562.69	43,606.88	42,689.47	41,288.57	41,024.46	39,484.72	39,407.77	38,151.63	37,351.97
CH <sub>4</sub> emissions excluding CH <sub>4</sub> from LULUCF	43,524.41	44,132.06	45,648.74	44,507.24	43,575.95	42,624.70	41,250.30	40,985.94	39,454.10	39,211.02	38,105.44	37,297.06
N <sub>2</sub> O emissions including N <sub>2</sub> O from LULUCF	37,381.94	38,103.11	39,505.92	39,560.44	38,813.40	38,292.59	39,303.02	37,572.16	32,236.36	31,581.95	29,494.79	27,827.34
N <sub>2</sub> O emissions excluding N <sub>2</sub> O from LULUCF	37,245.92	38,095.74	39,497.34	39,554.82	38,810.26	38,286.01	39,299.13	37,568.25	32,233.26	31,561.99	29,490.10	27,821.77
HFCs	351.00	671.29	1,985.67	2,549.75	3,191.29	3,901.91	4,635.03	5,400.56	6,106.19	6,855.26	7,512.98	8,172.52
PFCs	1,807.65	490.80	345.37	450.68	423.27	497.00	347.52	353.94	283.67	287.10	200.59	217.81
SF <sub>6</sub>	332.92	601.45	493.43	795.34	739.72	467.56	502.14	465.39	405.87	427.55	435.53	398.02
<i>Total (including LULUCF)</i>	<i>457,361.60</i>	<i>450,026.86</i>	<i>472,749.13</i>	<i>470,566.50</i>	<i>465,835.89</i>	<i>489,858.73</i>	<i>488,628.34</i>	<i>484,350.67</i>	<i>466,946.71</i>	<i>481,258.66</i>	<i>448,921.08</i>	<i>396,448.61</i>
<i>Total (excluding LULUCF)</i>	<i>519,156.67</i>	<i>529,950.65</i>	<i>551,640.35</i>	<i>557,476.32</i>	<i>558,667.80</i>	<i>573,477.48</i>	<i>576,599.59</i>	<i>574,893.07</i>	<i>563,911.21</i>	<i>554,568.96</i>	<i>541,748.90</i>	<i>491,119.58</i>
<b>GREENHOUSE GAS SOURCE AND SINK CATEGORIES</b>												
1. Energy	418,544.70	431,380.14	450,764.03	455,540.11	457,663.98	472,317.60	474,361.68	473,538.38	468,310.67	458,519.07	450,802.25	406,743.19
2. Industrial Processes	37,673.04	35,110.72	35,314.64	37,396.87	37,599.45	38,871.47	41,207.37	41,107.89	36,589.63	37,143.57	34,286.18	29,939.54
3. Solvent and Other Product Use	2,455.02	2,234.94	2,302.43	2,217.38	2,219.27	2,168.11	2,144.38	2,138.88	2,140.88	2,104.25	1,998.10	1,861.59
4. Agriculture	40,622.55	40,435.25	40,043.90	39,110.07	38,404.33	38,255.15	37,959.06	37,288.75	36,694.88	37,310.62	35,949.71	34,481.12
5. Land Use, Land-Use Change and Forestry	-61,795.08	-79,923.79	-78,891.21	-86,909.82	-92,831.91	-83,618.76	-87,971.25	-90,542.40	-96,964.50	-73,310.29	-92,827.82	-94,670.97
6. Waste	19,861.36	20,789.60	23,215.36	23,211.90	22,780.77	21,865.15	20,927.10	20,819.18	20,175.16	19,491.45	18,712.66	18,094.14
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>Total (including LULUCF)</i>	<i>457,361.60</i>	<i>450,026.86</i>	<i>472,749.13</i>	<i>470,566.50</i>	<i>465,835.89</i>	<i>489,858.73</i>	<i>488,628.34</i>	<i>484,350.67</i>	<i>466,946.71</i>	<i>481,258.66</i>	<i>448,921.08</i>	<i>396,448.61</i>

## Annex 5 – Emissions Projections

### *GHG emissions disaggregated by emission sector (Gg CO<sub>2</sub> eq.) WEM Scenario*

	2009	2010	2015	2020
Total excluding LULUCF	491,119.58	506,443.52	523,725.99	535,601.39
Total including LULUCF	396,448.61	411,864.71	422,724.10	428,176.42
1. Energy	406,743.18	421,674.92	435,404.58	445,239.93
2. Industrial Processes	29,939.55	30,809.54	35,026.07	38,894.07
3. Solvent and Other Product Use	1,861.59	1,861.59	2,014.00	1,963.00
4. Agriculture	34,481.12	34,232.16	33,853.40	3,042.97
6. Waste	18,094.14	7,865.31	17,427.94	16,461.43
7. Other	-	-	-	-
5. LULUCF	- 94,670.97	- 94,578.81	-101,001.89	-107,424.97

Source: ISPRA

### *GHG emissions from 1990 to 2020, disaggregated by end-use sector (Gg CO<sub>2</sub> eq.) WAM Scenario*

	2009	2010	2015	2020
Total excluding LULUCF	491,119.58	506,098.34	515,346.32	470,699.48
Total including LULUCF	396,448.61	411,519.53	414,344.42	363,274.51
1. Energy	406,743.18	421,329.74	427,024.91	380,338.01
2. Industrial Processes	29,939.55	30,809.54	35,026.07	38,894.07
3. Solvent and Other Product Use	1,861.59	1,861.59	2,014.00	1,963.00
4. Agriculture	34,481.12	34,232.16	33,853.40	33,042.97
6. Waste	18,094.14	17,865.31	17,427.94	16,461.43
7. Other	-	-	-	-
5. LULUCF	- 94,670.97	- 94,578.81	- 101,001.89	- 107,424.97

Source: ISPRA

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