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Report on the in-depth review of the third national communication of Italy

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I. INTRODUCTION AND NATIONAL CIRCUMSTANCES RELEVANT TO GREENHOUSE GAS EMISSIONS AND REMOVALS

A. Introduction

1. Italy ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 21 December 1993. It signed the Kyoto Protocol to the UNFCCC on 29 April 1998 and ratified it, along with the other members of the European Community (EC), on 31 May 2002. The UNFCCC secretariat received the first national communication of Italy (NC1) in 1995, the second (NC2) in 1999 and the third (NC3) on 20 January 2003.[1]

2. The NC3 was prepared under the overall coordination of the Ministry for the Environment and Territory (MATT); technical coordination was ensured by the Agency for the Protection of the Environment and for Technical Services (APAT). Preparation of the NC3 began in 2001 and was completed almost one year later. More than 60 experts from all relevant ministries and agencies[2] participated in its elaboration. The NC3 was elaborated on the basis of the "Revised Guidelines for national policies and measures for greenhouse gas emissions reduction" and the related National Action Plan to reduce greenhouse gas emissions, approved by the Inter-ministerial Committee for Economic Planning (CIPE) in December 2002.

3. The in-depth review of the NC3 was carried out between June 2003 and May 2004, including a visit to Rome from 23 to 27 June 2003. The review team consisted of Mr. Jiahua Pan (China), Mr. Stane Merce (Slovenia), Mr. Klaus Radunsky (Austria), Mr. Stephen Bygrave (Organisation for Economic Co-operation and Development – OECD) and Ms. June Budhooram (UNFCCC secretariat, coordinator). During the visit, the team met government officials and representatives from business and environmental non-governmental associations (NGOs).

B. National circumstances

4. Italy is a peninsula located in the south of Europe, bounded by the Mediterranean Sea and bordering Austria, France, Switzerland, and Slovenia in the north. The large islands of Sicily and Sardinia, together with a number of smaller islands located in the Mediterranean Sea, are also part of Italy. Its total area is 301,325 km^2 and most of the country is mountainous. In 2000 about 25 per cent of the territory (96.8 million ha) was covered by forests and 31 per cent by agricultural land.

5. Italy has a wide variety of ecosystems and landscapes, reflecting variations in climate from Mediterranean to alpine and continental. The average annual temperatures vary between 8 ºC in the mountainous north and 24 ºC in the southern coastal areas.

6. Italy is a bicameral parliamentary republic, with constitutional bodies being the Parliament, the Government and the President. It is divided into 20 regions, 103 provinces and 8101 municipalities.[3] The regions, which have marked disparities, are autonomous entities entrusted with power to design and

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[1] The submission date was 30 November 2001 (decision 11/CP.4).

[2] These included the Ministry for the Agricultural and Forestry Policies (MIPAF), Ministry for Productive Activities (MAP), University of Tuscia of Viterbo, Agency for the Protection of the Environment and for Technical Services (APAT), National Agency for New Technologies, Energy and Environment (ENEA) and National Institute for Geophysics and Volcanology (INGV), Italian Electro-Technical Experimental Centre (CESI), Fondazione Alma Mater, University of Firenze, ENI Corporate University, Fondazione ENI Enrico Mattei (FEEM), Italian Institute of Agrarian Economy (INEA), Italian National Research Council (CNR), Italian Air Force – Weather Service, International Centre for Theoretical Physics (ICTP), Italian National Statistical Institute (ISTAT).

[3] Provinces and municipalities are referred to as "local authorities".

implement their own policies but subject to the control and limits of the central state. Of the 20 regions, five (Friuli-Venezia Giulia, Trentino Alto Adige, Sardinia, Sicily, and Val D'Aosta) are governed under a special form of autonomy. Italy's population was estimated at 57.8 million in 2000 and it has the largest share of population over 65 years old of the OECD countries. With a population density of 192 inhabitants per square kilometre, Italy has one of the highest population densities in the OECD. Over 30 per cent of its population lives near Italy's exceptionally long coastline (almost 7,500 km).

7. The Italian economy, which is highly dependent on the services sector, grew by 16.9 per cent between 1990 and 2000 (see table 1). Per capita gross domestic product (GDP) was estimated at USD 21,885 (EUR 18,000 in 2000). Italy continues to have one of the lowest energy intensities (energy supply per unit GDP) in the world, just half of the OECD average, which can be attributed mainly to the prevalence of industries with low energy intensity, energy efficiency efforts and relatively high energy prices. In the 1990s the energy intensity of GDP was low (and almost constant); it changed slightly from 0.14 tonnes of oil equivalent per thousand USD purchasing power parity (PPP) in 1990 to 0.13 in 2000, whereas in the same period the average energy intensity of GDP for the EC decreased from 0.198 to 0.177.

Table 1. Main macroeconomic indicators and GHG emissions for Italy

	1990	1995	2000	Change (%) 1990–2000
Population (millions)	56.7	57.3	57.8	1.9
Gross domestic product – GDP (billions USD of 1995)[a]	1 082	1 153	1 265	16.9
Total primary energy supply – TPES (Mtoe[b])	153	161	172	12.4
Electricity consumption (TWh)	235	261	302	28.5
GHG emissions[c] (Tg[d] CO_2 equivalent)	508.6	520.4	543.8	6.9
GHG emissions per capita (Mg CO_2 equivalent)	9.0	9.1	9.4	1.04
GHG emissions per GDP unit (kg CO_2 equivalent per USD of 1995)	0.47	0.45	0.43	–8.5

Note: The data for population, GDP, TPES, and electricity are from "Energy balances of OECD countries, 1999–2000", OECD/IEA, Paris, 2002. GHG data are taken from updated inventory data provided during the review, which correspond to the 2003 annual inventory submission.

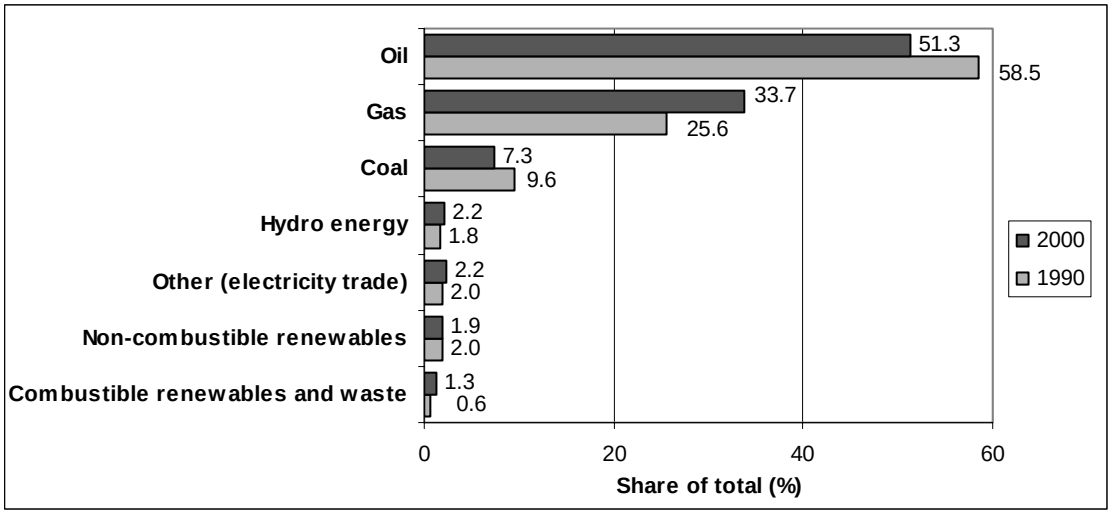
[a] GDP (billions USD of 1995 using PPP).

[b] Millions of tonnes of oil equivalent.

[c] Without accounting for land-use change and forestry (LUCF).

[d] One teragram (Tg) is equal to 1,000 gigagrams (Gg) or one million tonnes.

Figure 1. Structure of primary energy supply in Italy



8. Italy is highly dependent on imported energy and almost all of its energy supply is derived from fossil fuels. Oil still represents a large share of supply (51 per cent in 2000), but has decreased by 7.2 per cent since 1990. The use of natural gas has grown to 34 per cent in 2000, while coal shares were relatively stable throughout the decade (7 per cent) and renewable sources, mainly geothermal energy, accounted for 6 per cent. Italy has no nuclear power and is a small producer of oil and gas. In 2000, almost all of its oil (95 per cent) and gas (74 per cent) was imported. Approximately 15 per cent of its electricity is imported from France and Switzerland (see figure 1). Between 1990 and 2000 the primary energy demand in Italy grew at an average annual rate of 1.2 per cent, which is lower than the EC average of approximately 1.4 per cent.

C. Environmental policies

9. Since the preparation of its NC2, Italy has strengthened its national environmental institutions, issued new environmental legislation and further devolved environmental responsibilities to regional and local authorities. However, the central government still maintains responsibility for strategic planning and legal coordination for the environment.

10. Italy also made considerable progress in integrating environmental concerns into transport policies and practices. MATT was created in 1988 to oversee domestic and international environmental commitments, among other things, and to address environmental issues. Actions to combat climate change were started since 1994, when CIPE approved the National Programme for the Containment of Carbon Dioxide Emissions by 2000 at 1990 levels. On 3 December 1997, a second CIPE deliberation was approved to define a framework for the preparation of the programmes required to achieve Italy's GHG emissions reduction objective. The CIPE deliberation of 1997 stated, inter alia, that programmes had to be coordinated, and that an interministerial work group has to be appointed in order to achieve a higher level of integration in the elaboration of the above-mentioned programmes. According to the orientation deliberated by CIPE on 3 December 1997, in 1998 the Inter-ministerial Committee for Economic Planning was entrusted with revising the guidelines for national policies and measures regarding the reduction of GHG emissions, under the co-ordination of MATT, where reduction targets have been set for each action (expressed in Mt CO_2 equivalent) to be met by 2002, 2006 and 2008–2012. Following ratification of the Kyoto Protocol (law No. 120/2002) in December 2002, the CIPE approved the National Action Plan for 2003–2010 for the reduction of GHG emissions as well as the Revised Guidelines for National Policies and Measures Regarding the Reduction of Greenhouse Gas Emissions, containing the government's strategy to achieve Italy's emissions reduction target of 93 Mt CO_2 equivalent by 2010 under a "business as usual" scenario in order to meet the Kyoto target of 487 Mt CO_2 equivalent.[4] According to a CIPE deliberation of December 2002, an interministerial Technical Committee for greenhouse gas emissions (CTE), chaired by MATT, was set up to monitor progress in implementation of policies and measures, based mainly on indicators and sectoral-level emissions, and to identify additional measures to meet the Kyoto target on the basis of cost-effective analysis. In addition in 2002, both the budget and staffing of MATT have increased to meet the needs of the new plan, and new directorates have also been established to address sustainable development and protection from flooding and other natural disasters.

11. APAT reports to MATT and provides it with scientific and technical support; this role has recently been strengthened. In addition, in 1997 the competence of regions and local authorities was

[4] Both the Kyoto target of 487 Mt CO_2 equivalent and Italy's emissions reduction target of 98 Mt CO_2 equivalent presented in the NC3 were determined on the basis of data contained in national GHG inventories submitted to the UNFCCC in 2002 and used to prepare the CIPE deliberation of December 2002. Such data are different from the ones shown in table 2 and 3 of the present report, as these tables use data from the 2003 inventory submission to the UNFCCC.

strengthened to include the inspection and enforcement of environmental legislation in regions, with the introduction of regional environmental protection agencies (ARPAs).

12. As a member of the EC, Italy is required to translate and reflect EC environmental legislation into its national legislation. Italy has made a commendable effort in this regard, in that most of the EC directives on the environment have been translated into national law.

13. When the Government prepared its first strategy to address Italy's target under the Kyoto Protocol (see paragraph 13) in November 1998, it outlined six basic actions with quantitative goals for each of them. These included: (i) further promotion of efficiency in the electricity sector; (ii) reduction of energy consumption in the transport sector; (iii) more energy production from renewables; (iv) reduction of energy consumption in the residential, commercial and industrial sectors; (v) reduction of emissions from non-energy sources; and (vi) promotion of carbon sequestration in forests. Reduction targets, mainly voluntary, were assigned to each action to be met by 2002 (20–25 Mt CO_2 equivalent), 2006 (45–55 Mt CO_2 equivalent) and 2008–2012 (95–112 Mt CO_2 equivalent). In 1999 and 2000, policies and measures were introduced making use of a broader spectrum of instruments, including regulatory measures, market-oriented actions and fiscal incentives in the form of a carbon tax. The current strategy is intended to strengthen the above-mentioned actions, and there are also high expectations that flexibility mechanisms will be used to meet some of Italy's GHG reduction. It should be noted that, despite efforts to date, the emissions reduction milestone for 2002 (20–25 Mt CO_2 equivalent) was not reached.

14. The Kyoto Protocol commits the EC to an 8 per cent reduction in GHG emissions in the first commitment period (2008–2012). In order to achieve this reduction, under the EC-burden sharing agreement, Italy has agreed to reduce its emissions by 6.5 per cent. In 2000, GHG emissions were 6.9 per cent above 1990 levels.

II. GREENHOUSE GAS INVENTORY INFORMATION

15. The inventory data presented in the NC3 cover the period 1990–2000. They were prepared using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the IPCC Guidelines) as well as country-specific methods for calculating emissions, where available. The national inventory team used to a limited extent the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (hereinafter referred to as the IPCC good practice guidance) for the preparation of the inventory data contained in the NC3.

A. Inventory preparation

16. The Italian inventory of greenhouse gases (GHGs) is prepared and updated annually by APAT, which obtains the required data from the energy statistics published in the National Energy Balance by the Ministry of Production Activities, industrial and agricultural production data published by the National Statistical Institute (ISTAT), statistics on transportation provided by the Ministry of Transportation, data on land-use change and forestry (LUCF) provided by national statistics and from research at national and regional level, and data supplied directly by the relevant industrial associations.

17. The review team was informed of the creation of the National Statistical System (Sistan), which provides input to the preparation of the national inventory, and is expected to be an important component of the future national inventory system. The Sistan will co-ordinate statistical data flows and their update is expected to contribute to compliance with the requirements of Article 5.1 of the Kyoto Protocol.

18. At the time of the review team's visit, the latest inventory submission to the UNFCCC was available[5] and contained updated emission estimates compared to those presented in the NC3. These updated values are used in the discussion on GHG emission trends that follow.

19. Italy submitted inventory data using the common reporting format (CRF) of the UNFCCC reporting guidelines on inventories. No national inventory report (NIR) was provided and the CRF tables with background data are available only for the years 1998–2001, not for previous years. The national inventory team informed the review team that there are plans to prepare a full set of CRF tables for the base year but not for the complete series, because of resource constraints.[6] With these exceptions, the inventory covers all major sources and sinks, as well as all direct and indirect gases, included in the IPCC Guidelines. Inventories include estimates for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and the fluorinated gases – perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) – as well as GHG sinks. Emissions from the use of biomass as a fuel (CO_2) and international bunker fuels (CO_2, CH_4, N_2O) are also presented.[7] The base year used is 1990 for CO_2, CH_4 and N_2O and 1995 for PFCs, HFCs and SF_6.

20. It was difficult to fully assess the transparency of the inventory, as defined by the UNFCCC reporting guidelines for preparing national communications (hereinafter referred to as the UNFCCC reporting guidelines), given that some essential support material was not available. This missing information includes an NIR and completed CRF tables covering recalculations. The national inventory team explained that insufficient staffing was the reason for not submitting an NIR. The review team suggested that Italy provide more comprehensive information in future by filling in the CRF tables.

21. The review team also noted that Italy has not yet established a national system for collecting and compiling the basic data needed for the inventory within the time scheduled, as well as determining and assigning roles and responsibilities to the various institutions that take part in the preparatory phases of the national GHG inventory. The review team highlighted the need to establish a robust national system (building on the base of the experience of Sistan), which should have a sound legal basis, as the key to addressing the most important shortcomings (such as timeliness, lack of transparency and completeness of the inventory) identified above. This should help to overcome the lack of resources, which has been identified as the most relevant bottleneck in improving the inventory in order for Italy to meet all its commitments under the Convention,[8] in addition to the problem of confidentiality of market-relevant data (energy sector, fluorinated gases).

22. Emissions of GHGs for the base year 1990 have changed from those reported in the NC2. This change resulted from a revision of CO_2 data in energy consumption for maritime transport, where consumption originally considered to be international bunkers was moved to the domestic shipping category. Moreover, emissions from the production of geothermal energy have been revised on the basis of new data in which the current CO_2 emissions are estimated to be equal to the natural flows in those areas. For CH_4, the emission factors previously utilized for compost production were revised, and for N_2O, the emission factors for electric power plants were updated.

23. Further modifications were made in the time series. Activity data were updated using the IPCC Good Practice Guidance. These revisions had a particularly important effect on CO_2 emissions from lime

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[5] http://unfccc.int/program/mis/ghg/submis2003.html

[6] Since the review the situation has improved. An NIR was provided for the September 2003 submission to the UNFCCC secretariat. GPG have been fully implemented in preparing the National emissions inventory for 2004.

[7] There are still some gaps in the data (e.g. the use of N_2O for anaesthesia and from aerosol cans and fire extinguishers), and Italy was encouraged to provide the missing emission data.

[8] For example, the implementation of the Good Practice Guidance by Annex I Parties by 2003.

production. The direction of change (increase or decrease in base year emissions) could not be assessed on the basis of the submissions, as insufficient data are available and the recalculation table was not completed in the 2003 CRF submission.[9] However, information provided during the review showed that total GHG emissions for the base year are 2.3 per cent lower than previous estimates in the NC3, with specific changes being –2.6 per cent for CO_2, –1.9 per cent for CH_4 and +0.2 per cent for N_2O.

24. In estimating GHG emissions, a combination of national (country-specific), IPCC default and CORINAIR[10] emission factors have been used. For the energy sector, CO_2 emission factors were mainly country-specific. The methods used mostly correspond to IPCC default methods. For the energy sector the IPCC default methods were supplemented by detailed tier 2 and 3 methods of the IPCC Guidelines.

25. Confidence levels for specific estimates and uncertainties of the emission estimates were not discussed in the NC3. However, the review team was presented with the first results of calculations of uncertainty by sector and for total GHG emissions, excluding LUCF. These results are mainly based on expert judgement and show that the overall uncertainty level of the inventory is quite low (about 3 per cent). The level of uncertainty for forests (sinks) is expected to be high because the last forest inventory was conducted almost 20 years ago (1985) and the next one is planned for 2005. Estimates reported in the NC3, which are based on different data sources from those presented during the review team's visit, differ by about a factor of 2. Another forest inventory is planned for 2012 to calculate Kyoto Protocol estimates for forests under the Kyoto Protocol.

26. No information is available in the NC3 to determine whether the inventory data for any sector was subject to any self-verification or independent review procedures. However, the review team was informed that using the reference approach as well as independent calculations of emissions/removals of CO_2 emissions[11] qualifies as independent verification because these calculations are based on different statistical data and are conducted by various institutions at the request of MATT.

27. The review team acknowledged Italy's ongoing efforts to further improve the emission inventory. These efforts focus on the energy sector. To further improve the sectoral split, preliminary results of a tier 1 key source assessment were presented, and in a joint effort with other Mediterranean countries (Spain, France, Greece, Portugal) emission estimates for transport, agriculture, forests, non-methane volatile organic compounds (NMVOC) and solvent use will be improved.

28. Additional improvements may be triggered by the Technical Committee for Greenhouse Gas Emissions (CTE). However, the review team noted that any specific inventory improvement programme is hindered by a lack of resources. It was also noted that Italy falls short of fully implementing the IPCC Good Practice Guidance,[12] which should be fully implemented by Annex I Parties by the end of 2003.[13]

29. Data on GHG emissions in table 2 show that overall emissions (excluding CO_2 emissions and removals from LUCF) increased by 6.9 per cent or 35 Mt CO_2 equivalent between 1990 and 2000, from 509 to 544 Mt CO_2 equivalent, while the national commitment for reducing emissions by the period

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[9] No CRF tables were available for previous inventory submissions.

[10] The Co-ordination of Information on Air Emissions (CORINAIR) is one methodology that is used for GHG inventory preparation.

[11] Emissions in the energy sector were also estimated using the IPCC reference approach. Estimates by the sector and reference approach differ by less than 2 per cent.

[12] Key elements of full implementation are: key source analysis, quantitative estimates of uncertainty for key sources, choice of higher tier methods including use of national emission factors for key sources, specific quality assurance/quality control for key sources, transparent documentation and reporting.

[13] A full set of CRF tables from 1990 to 2002 was provided in Italy's 2004 inventory submission to the UNFCCC secretariat.

2008–2012 is 6.5 per cent compared to the base year level, corresponding to 33 Mt of CO_2 equivalent below the level of 1990. Although the increase from year to year has been decreasing, the review team believes that the implementation of policies and measures needs to be substantially intensified to curb the emissions in order to meet Italy's commitments under the Kyoto Protocol.

Table 2. GHG emissions by gas, 1990–2000

	Tg CO_2 equivalent											Change (%) 1990–2000
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	
Net CO_2 emissions/removals	404.6	404.8	406.0	397.9	393.5	419.4	413.9	421.8	433.7	438.9	445.3	10.1
CO_2 emissions (without LUCF)	428.2	428.0	427.8	418.5	413.0	439.0	434.1	439.5	451.1	456.6	461.0	7.7
CH_4	38.7	39.1	37.3	36.9	37.3	37.9	37.7	37.7	37.1	36.7	36.5	–5.7
N_2O	40.9	42.2	41.4	41.6	40.8	42.0	41.5	42.7	42.4	43.3	43.5	6.4
HFCs	0.35	0.36	0.36	0.36	0.48	0.67	0.45	0.75	1.17	1.44	1.99	197[a]
PFCs	0.24	0.23	0.21	0.20	0.21	0.27	0.18	0.18	0.20	0.19	0.23	–14.8[a]
SF_6	0.33	0.36	0.36	0.37	0.42	0.60	0.68	0.73	0.60	0.40	0.49	–18.3[a]
Total (with net CO_2 emissions/removals)	**485.1**	**487.0**	**485.6**	**477.3**	**472.7**	**500.8**	**494.4**	**503.8**	**515.2**	**520.9**	**528.1**	**8.9**
Total (without CO_2 from LUCF)	**508.6**	**510.2**	**507.4**	**498.0**	**492.2**	**520.4**	**514.7**	**521.6**	**532.6**	**538.6**	**543.8**	**6.9**

Source: This table uses the data from the 2003 inventory submission to the UNFCCC. Discrepancies in totals are due to rounding errors.
[a] Figures for fluorinated gases are given as a percentage of the base year (1995).

B. Overall emission trends

30. Figure 2 shows the main GHG emission trends between 1990 and 2000. The most important GHG is CO_2, accounting for 85 per cent of the national total over the period 1990–2000, excluding LUCF; the proportion of CH_4 and N_2O, approximately 15 per cent altogether, showed a slight increase (2.1 per cent) in this period, while fluorinated gases increased from 0.3 per cent to 0.7 per cent of the total in the same period. The percentage distribution of the various sectors (see table 3) remained unchanged over the period. The energy sector in 2000 was responsible for the largest proportion of GHG emissions (84 per cent), followed by agriculture (8 per cent), industrial processes (6 per cent), and waste (2 per cent).

Figure 2. Trends in the main GHG emissions of Italy, 1990–2000

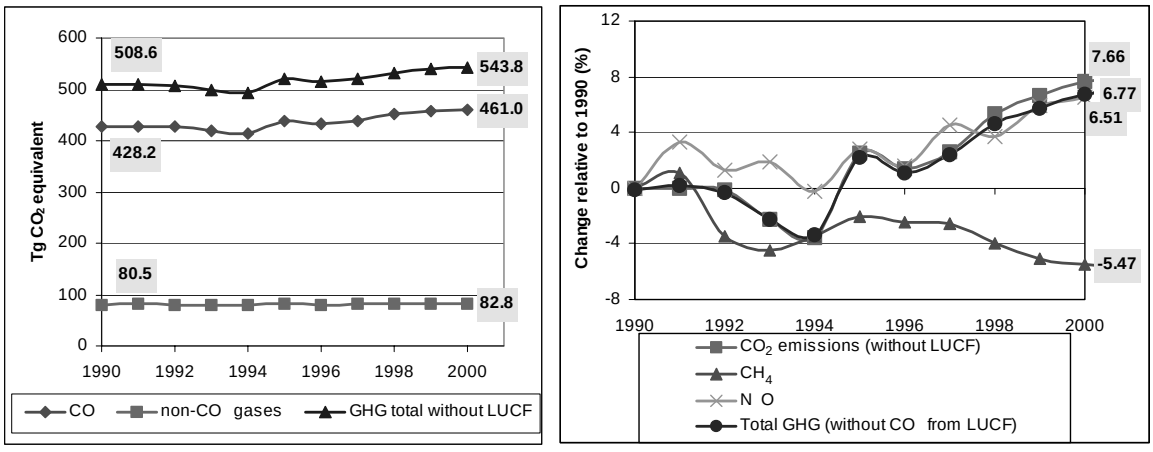


Table 3: GHG emissions by sector

	Tg CO_2 equivalent											Change (%) 1990–2000
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	
Energy	420.0	420.0	418.9	412.3	407.3	432.2	429.2	434.4	445.8	451.7	455.1	8.4
Energy industries	141.6	137.4	137.1	128.1	131.4	145.3	141.7	144.7	152.7	151.7	160.2	13.2
Manufacturing industries and construction	85.6	82.2	81.7	81.8	82.5	84.7	82.5	85.4	81.6	82.6	81.7	–4.6
Transport	104.5	107.1	111.6	113.4	113.4	115.4	116.7	118.6	122.7	124.0	124.6	19.2
Other	80.5	85.9	81.2	81.9	72.8	79.8	81.5	78.9	81.9	86.5	81.8	1.6
Fugitive emissions	7.8	7.4	7.3	7.1	7.1	6.9	6.8	6.8	6.9	6.8	6.8	–12.1
Industrial processes	31.1	31.3	31.3	28.4	27.4	30.4	28.2	28.8	29.4	30.9	32.2	3.5
Solvent and other product use	1.7	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.3	–23.1
Agriculture	42.8	43.8	43.2	43.3	43.1	43.0	42.6	43.6	42.8	42.5	42.0	–1.9
Land-use change and forestry	–23.5	–23.2	–21.8	–20.7	–19.4	–19.6	–20.2	–17.8	–17.4	–17.7	–15.6	–33.6
Waste	13.0	13.4	12.4	12.5	12.9	13.4	13.4	13.4	13.3	12.9	13.1	0.8
Total (with LUCF)	485.1	487.0	485.6	477.3	472.7	500.8	494.4	503.8	515.2	521.6	528.1	8.9
Total (without LUCF)	508.6	510.2	507.4	498.0	492.2	520.4	514.7	521.6	532.6	539.3	543.8	6.9

Note: Data were updated by Italy's inventory team and provided during the review. Discrepancies in totals are due to rounding errors.

C. Trends in key emission sectors

31. Emissions of CO_2, excluding emissions and removals from LUCF, increased by 7.7 per cent or 32.8 Mt CO_2 equivalent, from 428.2 Mt in 1990 to 461 Mt in 2000. Energy industries (35 per cent) and transport (27 per cent) contributed the most to total energy emissions. The manufacturing and construction industries and non-industrial combustion each accounted for 18 per cent, while the remaining emissions came from fugitive emissions and others. Between 1990 and 2000, emissions from energy industries increased by 13 per cent and emissions from transport by 19 per cent whereas emissions from manufacturing decreased by 5 per cent in the same period. Total emissions from the energy sector increased by 8.4 per cent, from 420 Mt to 455.1 Mt CO_2 equivalent, in this period. Emissions from the industrial processes sector increased by 3.5 per cent in the period 1990–2000, from 31.1 Mt to 32.2 Mt CO_2 equivalent. Given the dominant share of emissions from the energy industries and the transport sector, the successful implementation of policies and measures in those two sectors will be crucial if Italy is to meet its commitments with regard to the level of GHGs.

32. Emissions of CH_4 in 2000 were 36.5 Mt CO_2 equivalent, 6.7 per cent of total GHGs, representing a decrease of approximately 2 Mt (5.7 per cent) compared to 1990. In 2000 the major sources of CH_4 emissions were agriculture, which accounted for 50 per cent of total emissions, waste (30 per cent) and energy (19 per cent). Emissions in the agricultural sector originate mainly from enteric fermentation and manure management. These decreased by 6.2 per cent and 1.7 per cent respectively, as a result of a decrease in the number of animals, especially cattle and pigs. Activities typically leading to emissions in the waste management sector are landfills and industrial waste-water handling. The waste sector in 2000 showed an increase in emissions (1.2 per cent compared to 1990) due to increased industrial waste-water handling and waste incineration. Emissions of CH_4 in the energy sector decreased by 5.8 per cent as a result of a reduction in emissions from leakages in fossil fuel extraction and distribution (–24 per cent), with the gradual replacement of old natural gas distribution networks.

33. In 2000, N_2O emissions represented 8 per cent of total GHGs (corresponding to 43.5 Mt CO_2 equivalent), with an increase of 6.4 per cent between 1990 and 2000, from 40.9 Mt to 43.5 Mt CO_2 equivalent. The major source of N_2O emissions was the agricultural sector (55 per cent), due to the use of both chemical and organic fertilizers in agriculture, as well as manure management. Emissions in this sector increased by 2.6 per cent during the period 1990–2000. Emissions in the energy-use sector

(22 per cent of the total emissions of N_2O) showed an increase of 13 per cent in 1990–2000. This growth can be attributed primarily to the road transport sector and is related to the introduction of three-way catalytic converters. The industrial processes sector accounted for 20 per cent of N_2O emissions. The emissions in this sector increased by 22 per cent between 1990 and 2000. Emissions from waste (2.5 per cent) originate mainly from domestic and industrial waste-water handling.

34. Emissions of fluorinated gases increased overall by 164 per cent between 1995 and 2000 and represented 0.5 per cent of total GHG in 2000, corresponding to 2.7 Mt CO_2 equivalent. From 1995 to 2000 HFCs increased by 197 per cent (from 0.7 Mt to 2.0 Mt CO_2 equivalent). The main sources of emissions are refrigeration and air-conditioning equipment, and pharmaceutical aerosols. Increases in emissions during this period were due to the use of HFCs as replacements for ozone-depleting substances and as refrigerants in automobile air conditioners. Emissions of PFCs decreased by 14.8 per cent between 1995 and 2000. Emissions of SF_6 decreased by 18.5 per cent in the same period and were equal to 0.5 Mt CO_2 equivalent in 2000; 65 per cent of them are due to the gas contained in electrical equipment. Other emissions result from the use of these gases in the production of semiconductors and in magnesium foundries, which has been rising in recent years, unlike emissions from electrical equipment.

III. POLICIES AND MEASURES

35. The institution in the Central Administration responsible for the development of climate change policies and measures is MATT. In order to ensure the integration between climate change policies and energy policies, MATT cooperates on a regular basis with the Ministry of Production Activities, the latter being particularly important in determining energy policy. The Ministries of Agricultural and Forestry Policies; Infrastructures and Transport; Education, University and Research; Economy and Foreign Affairs are also involved in defining climate change policies through CIPE, which also ensures the co-ordination of climate change initiatives undertaken by the Central Administration.

36. The CTE was established in 2002, with representation from all of the above key ministries. Its mandate is to monitor progress in the implementation of policies and measures and to identify possible additional measures. The CTE had its first meeting in March 2003, at which it identified two key scenarios for policies and measures and emission reductions: the “trend” scenario comprising policies and measures already under way, and the “reference” scenario, integrating measures identified as of 30 June 2002 and to be implemented in 2003–2012.

37. Most policies and measures in the existing “trend” scenario are aimed at reducing emissions from the energy sector, reflecting the largest source of emissions in Italy. The major focus is on a switch to natural gas and renewables, as well as energy efficiency. As with many other OECD countries, emissions from the transport sector are an area of focus. Existing measures in the “trend” scenario account for some 77 Mt CO_2 equivalent of emission reductions.

38. There are a number of additional policies identified and approved under the “reference” scenario amounting to some 52 Mt CO_2 equivalent of emission reductions, including 12 Mt CO_2 equivalent from Joint Implementation and Clean Development Mechanism activities. There is an outstanding gap of 41 Mt CO_2 equivalent to meet the country’s target under the Kyoto Protocol. Italy has identified a significant suite of additional policies and measures to meet this remaining gap, including domestic measures as well as CDM and JI activities. At the time of the review, there was no decision on which measures will be selected from the large number of additional policies identified under the “reference” scenario, as well as the extent to which there will be a reliance on domestic measures as opposed to the Kyoto flexibility mechanisms. Some of the additional domestic measures that have been identified are expensive, although they have other ancillary benefits. The CTE will elaborate the report on the

implementation of policies and measures included in the "reference" scenario, and report on emission trends by the end of 2004.

39. In terms of funding, the National Action Plan for 2003–2010 has an approved budget of EUR 25 million per year for 2002–2004, mainly to support pilot projects to enhance energy efficiency and promote clean fuels and engines and carbon sinks, and EUR 68 million per year by 2003 to support projects in developing countries and countries with economies in transition aimed at reducing GHG emissions.

40. The NC3 provides more extensive detail on individual policies and measures and emission reductions than the NC2. Whereas the NC2 mostly listed a range of possible options and approaches that could (and were yet to) be implemented in the various sectors to reduce GHGs, policies and measures in the NC3 are more defined. A number of important policies and measures are now in place, with a broad suite of additional measures planned for future implementation. Most initiatives are being implemented at the national level, particularly a shift to natural gas and renewables.

41. Italy is at a relatively early stage of its implementation of policies and measures. Most measures implemented to date are in the energy and transport sectors. Whereas specific initiatives have been identified in the industry, forestry and agriculture sectors, these are additional measures that have yet to be implemented widely. Most initiatives are being implemented at the national level, particularly a shift to natural gas and renewables. However, there are a number of interesting initiatives that have been implemented at the regional level, for example in Lombardy, Emilia-Romagna, and Liguria, which have focused on the residential, commercial and service sectors. There are a few innovative measures that are being implemented at the national level, including renewable energy certificate trading and energy efficiency trading.

42. There is generally a good match between the policies and measures identified and Italy's emission profile. The NC3 also provides detailed information on emission reductions associated with policies and measures, as well as the costs of measures. The final identification of future measures will be decided by CTE on the basis of a cost-effectiveness analysis.

43. There has also been some monitoring of the effectiveness and performance of individual policies and measures in Italy. A recent study commissioned by APAT and conducted by a consulting group (Ecofys) examined the effectiveness of implemented and planned policies and measures. Other monitoring is being carried out by the individual government agencies responsible for implementing the various initiatives. For some measures, there are a large number of institutions involved in jurisdiction, particularly in the transport sector. Some barriers to implementation of policies and measures have been noted at the local level, for example the number of regulations restricting an increase in the use of waste in the cement sector.

44. Industry has been widely consulted in the identification of policies and measures. A number of voluntary agreements with industry are in place, but despite the cost-effectiveness of some of the initiatives identified, there have been some delays in implementing measures, for example those relating to reduction of the fluorinated gases and emissions from production of adipic acid and nitric acid. Also, the implementation of some policies and measures has been delayed as a result of opposition from local authorities to industrial and infrastructure projects.

45. In December 1998, Italy introduced a carbon tax applicable to all hydrocarbon fuels (Law 448/1998). The law fixed the initial value of the tax for 1999 at EUR 0.52 per tonne of coal, petroleum, coke and Orimulsion used in combustion plants and determined the target rate for 2005, to be reached progressively. Increases between 1999 and 2004 were to be decided on a yearly basis by the

government and set by decrees. However, in September 2000, Decree 268/2000 suspended the planned carbon tax increases because they were excessively burdening the price of energy as a result of high oil prices. The tax continues to be implemented at the 2000 level.

46. In December 2002, under Law 120/2002, EUR 25 million was approved to be spent annually between 2002 and 2004 to support pilot projects, to enhance energy efficiency, to promote clean fuels and engines and to enhance carbon sinks both domestically and internationally. These funds are new and additional. Italy has initiated project opportunities under the CDM in the Balkans, China and North Africa. Projects currently being examined include renewable energy, waste handling and disposal, transport, energy demand, and construction. Italy is also considering how best to integrate emissions trading into its domestic greenhouse response, and this will be influenced by the process of developing its national allocation plan under the EC emissions trading directive, which is currently expected to commence in January 2005.

47. A number of measures are motivated by concerns other than climate change. For example, in the transport sector there is some incentive to switch from road to rail because of the stricter requirements on heavy goods vehicles travelling through Austria and Switzerland. Italy's switch to natural gas is part of a broader national energy plan to move away from fuel oil, which is more expensive, and currently a major element of Italy's fuel supply mix. Many of the infrastructure measures approved meet other development policy objectives in Italy, for instance the infrastructure of ports, rail and road. Some of the forest measures approved will assist in the stabilization of areas with hydro-geological imbalances.

48. A few innovative measures are being implemented, including renewable energy certificate trading and energy efficiency trading.

A. Energy

49. In 2000, emissions from the energy sector made up some 84 per cent of Italy's total GHG emissions. Emissions from this sector in 2000 were 8.4 per cent greater than in 1990. The main GHG in this sector is CO_2 (80 per cent), followed by CH_4 (20 per cent). Italy already has lower CO_2 emissions per unit GDP than other European countries, and has relatively high energy efficiency and low energy intensity.

50. Italy has been progressively opening its energy market as part of the EC process to achieve a single energy market. The EC directives for electricity and gas market liberalization were transposed into national legislation in 1999 and 2000 respectively. As a result, ENEL, Italy's state-owned main electricity company, has had to sell a large part of its generating capacity as new decrees have imposed a cap to stop companies controlling more than 50 per cent of capacity. The main fuel source for power generation is fuel oil (50 per cent), followed by hydro (20 per cent), gas (20 per cent), coal (10 per cent) and renewables (6 per cent). Electricity power generation is not evenly distributed: there is an excess of electricity in the south of Italy, although the highest consumption is in the north; interconnection facilities are poor in some regions; there is power overload in the area around Florence; there is a lack of generating capacity in Rome and Naples; the islands have excess capacity but are far away from the main electricity grid on the mainland. Italy has the highest wholesale electricity price at EUR 62/MWh (April 2003), almost three times that of rest of Europe. The average price of gas is also higher in Italy than in the rest of Europe.

51. Existing policies and measures in the energy sector are focused on upgrading existing plants, increasing co-generation, promoting renewable energy, and reducing demand for electricity and gas. Emission reductions from existing policies and measures in the energy sector account for around 48 Mt CO_2 equivalent of all reductions. A key strategy for Italy in reducing emissions from the energy

sector is a switch from fuel oil to gas. Electricity generation with combined-cycle gas turbines (CCGT) is cheaper (3–3.5 cents/kWh) than with fuel oil (4–5 cents/kWh). A key initiative in this regard is the conversion of 15,000 MW of existing fuel-oil plants to CCGT. Emission reductions from increased efficiency of power plants, increased co-generation and use of natural gas are estimated at 19.7 Mt CO_2 equivalent and to this end, a voluntary agreement with ENEL was signed in December 2000. Emission reductions from this measure are estimated at 12 Mt CO_2 equivalent by 2012. The carbon tax (see paragraph 42 above) is applied at a higher level on coal than on fuel oil and natural gas.

52. Existing measures also focus on increasing generation from renewable energy sources. A ministerial decree of 11 November 1999 (Decree No. 106) supports the generation of at least 2 per cent of the electricity supply from renewable energy sources, which is expected to reduce emissions by 6 Mt CO_2 equivalent. In addition to this requirement Decree No. 106 supports a programme for 10,000 photovoltaic roofs, which is expected to reduce emissions by around 0.12 Mt CO_2 equivalent per year.

53. Measures approved under the "reference" scenario but not yet implemented in the energy sector include the construction of 3,200 MW of additional combined-cycle capacity, and an increase in renewable energy of 500–1,200 MW by 2010.

54. An additional measure, relating to EC Directive 2001/77/CE, is the installation of a further generating capacity of 2,800 MW from renewable energy. This is estimated to increase the proportion of power generated from renewables in Italy to 5 per cent by 2008. It is estimated that there is some additional 5,900 MW of renewable energy capacity, from wind, biomass and waste technologies. Research is under way to introduce hydrogen as a fuel in energy systems and the transport sector.

55. Further energy measures outlined for the residential, commercial and service sectors include increasing the use of natural gas in residential units, and enlarging and upgrading natural gas transport lines. Other planned measures include decrees on final energy use, such as more energy-efficient boilers, fluorescent lamps, solar hot-water systems and double-glazed windows; reduced energy consumption in new buildings; labelling of home appliances; and extending decrees on end-use efficiency and the use of solar thermal energy.

56. There are regional initiatives on GHG reduction targets, for example in Lombardy (regional target of 3.46 Mt CO_2 equivalent), Emilia Romagna (regional target of 3.4 Mt CO_2 equivalent) and Liguria (regional target of 0.8 Mt CO_2 equivalent), with a number of innovative measures including energy certification of buildings, integration of renewable energy sources in buildings, and energy audits in the service industries.

B. Transport

57. The transport sector accounted for 26 per cent of total GHG emissions in Italy in 2000. A number of measures have been implemented in this sector under the responsibility of a large number of institutional entities. Measures include voluntary agreements with the car manufacturer Fiat, Italy's largest vehicle manufacturer, to support greater use of alternative fuels such as natural gas, liquefied petroleum gas (LPG), and biodiesel; the promotion of collective transport; and increasing the efficiency of freight transport.

58. The voluntary agreement with Fiat focuses on reducing emissions from cars from 164 g CO_2/km to 145 g CO_2/km, and is estimated to reduce CO_2 emissions by 6.8 Mt CO_2 by 2010. Measures focusing on the greater use of alternative and renewable fuels include acquiring cars operating on compressed natural gas (CNG) and LPG, and promoting biodiesel in distribution networks and public transport. Measures relating to alternative fuels are expected to reduce emissions by 1 Mt CO_2 by 2010.

59. Measures approved in the "reference" scenario but not yet implemented include shifting to low-carbon fuels; optimizing private transport systems and car pooling; and infrastructure investment. Shifting to low-carbon fuels is expected to result in emission reductions of 1.5 Mt of CO_2 by 2010, and includes the promotion of natural gas buses or hybrids, that is buses that are able to run on either diesel or natural gas. Costs for alternative fuels are generally high, at EUR 39/tonne. Additional measures that have been identified to support LPG vehicles should increase their number from 1.4 million vehicles in 2000 to 3.5 million vehicles by 2010. In 2000, there were 400,000 vehicles in Italy running on CNG. There is an agreement with Fiat to increase this number, in addition to the voluntary agreements already in place.

60. Collective transport measures identified include the promotion of car pooling, car sharing, collective taxis, and computerized systems for freight transport. Emission reductions from these are estimated at about 0.5 Mt CO_2 equivalent.

61. Infrastructure investment includes restructuring port facilities to meet greater demand for coastal shipping, re-opening inland waterways, completing high-speed railway lines, and providing dedicated lanes for public transport in urban areas. Infrastructure initiatives established in the "reference" scenario and yet to be implemented are estimated to reduce emissions by 3.9 Mt CO_2 equivalent by 2010.

62. Additional measures in the transport sector that have been identified but are yet to be implemented include improving the energy efficiency of heavy transport vehicles, greater use of biodiesel, promotion and development of automobile transport on trains for medium to long range trips, car pricing in metropolitan areas, use of computerized systems for traffic management and control of traffic lights.

C. Industry

63. Industrial processes accounted for around 6 per cent of total GHG emissions in Italy in 2000. There are two key groups of policies and measures in the industry sector – voluntary agreements and direct or indirect financing in specific sectors.

64. Following an evaluation by the independent consulting company Ecofys, emission reductions expected from a voluntary agreement with Montedison, a company distributing electricity and natural gas, have been revised downwards from 10 Mt to 0–0.3 Mt of CO_2 equivalent as a result of a reduction in fluorinated gases. Other voluntary agreements include one with Assovetro, a glass producer, though the absolute emission reductions to be achieved are uncertain. A reduction in emissions from the production of nitric acid and adipic acid could be implemented through a voluntary agreement with the industry association.

65. Other measures include an increase in the use of natural gas by industry, expected to result in emission reductions of 3.0 Mt of CO_2 equivalent. A number of other measures that have been identified in the industry sector are yet to be implemented. These include increasing the efficiency of electric motors and transformers, co-generation and production of energy from waste. Much work has already been done in Italy on co-generation in industry, and there is potential to expand medium-size co-generation plants (in the10–20 TWh range) with potential CO_2 reductions of between 0.8 and 1.5 Mt CO_2 equivalent by 2010.

66. There is also a focus on decreasing the amount of waste going to landfill and increasing energy recovery through the combustion of the dry fraction of wastes. With a total use of waste for electricity generation of around 7 per cent Italy is below the European average of 20 per cent, with some countries as high as 50 per cent. Increasing energy from waste requires a number of resolutions at the local level,

where there are greater restrictions in Italy than in other countries. Potential emission reductions are in the order of 1.8 to 3 Mt CO_2 equivalent by 2010.

67. Additional measures not yet established include a reduction of N_2O emissions from the production of adipic acid and nitric acid. Potential emission reductions from the production of adipic acid are around 5.9 Mt CO_2 equivalent and have a relatively low cost (EUR 0.5/tonne CO_2 equivalent).

68. Other initiatives are being considered for fluorinated gases, including recycling aluminium, using different fluids in the manufacture of semiconductors, reducing leaks in mobile air conditioners and reducing leakage of SF_6 from electrical equipment.

D. Agriculture

69. The agricultural sector accounted for 7.7 per cent of total GHG emissions in Italy in 2000. There was a 1.9 per cent decrease in emissions from 1990 to 2000. Emission reductions of 5.4 per cent are forecast for the "trend" scenario by 2010. Trends include a slight reduction in the number of cattle, a possible increase in pigs and poultry and a slight decline in the consumption of nitrogen fertilizer.

70. The agricultural sector is currently the highest source of CH_4 emissions (48 per cent) and N_2O emissions (56.5 per cent). The high proportion of N_2O emissions in the agriculture sector is due to the use of both chemical and organic fertilizers, as well as manure management.

71. Italy is examining the rational use of fertilizers, and associated reduction in N_2O from soils. Specific policies include increasing awareness and adopting codes of good agricultural practice. Estimated reductions relating to EC Directive 676/91 are in the order of 0.46 Mt CO_2 equivalent.

72. There has also been a focus on reducing energy consumption in the agriculture sector. Assuming a reduction of 30 per cent, it is estimated that emissions could be reduced by around 0.337 Mt CO_2 equivalent.

73. Additional measures identified in the NC3 include emission reductions from reduced energy consumption in organic agriculture and N_2O emission reductions from soil relating to better use of fertilizer, especially a reduction in urea use. Total emission reductions are estimated to be 0.42–0.75 Mt CO_2 equivalent in 2005 and 0.81–1.49 Mt CO_2 equivalent in 2010. Some of the additional measures were noted as having high costs.

74. Other proposed measures involve using biogas from agricultural manure, in particular piggeries, though these initiatives have not been implemented and their potential is yet to be identified. Potential CH_4 emission reductions are between 7 and 39 kt per year, at an overall cost of EUR 6.2–33.2 million per year.

E. Land-use change and forestry

75. Italy's total forest area is 9.68 million ha according to the Global Forests Resources Assessment 2000 (FRA 2000) of the Food and Agriculture Organization (FAO). Sixty per cent of the forested area is owned privately, 27 per cent by municipalities, 7 per cent by the state and regions and 6 per cent by the church. The country is rich in biodiversity and has a wide variety of landscape types. It has the richest flora in Europe, with 5,463 plant species, 712 of which are native.

76. The main objectives of forest policy are to maintain and expand forest cover and to improve forest management. The last forest census was conducted in 1986. Italian experts noted during the review, that the area of managed forests was calculated based on an erroneous interpretation of FRA 2000, which amounted to about 10 per cent of the total forest area. For Italy, only forests with specific

management plans were included in the figure given for forests under management. All other forests in the country are submitted to general silvicultural prescriptions. Therefore, in agreement with the definition applied for Europe for "area under forest management plans" the whole Italian forest surface must be considered under this category: about the 11 per cent under formal plans (management plan) and about the 89 per cent under informal plans (general silvicultural prescriptions). Italy believes that this figure has been severely underestimated and will be applying to the UNFCCC under decision 11/CP.7, paragraph 12, to have its forest management data updated.

77. Additional measures identified as having emission reduction potential by 2008–2012 include improved forest management (4.1 Mt CO_2 equivalent), afforestation and reforestation activities (1 Mt CO_2 equivalent), "natural reforestation" (3 Mt CO_2 equivalent), and new plantings on abandoned public land and areas of hydro-geological imbalance (2 Mt CO_2 equivalent). Forest experts highlighted that the maximum potential for carbon removal in Italy is estimated at 10.2 Mt CO_2 equivalent using current methodologies.

78. Afforestation and reforestation have increased from 3,104 ha in 1990 to 117,428 ha in 2000. Stored carbon in these areas is estimated to have increased from 0.0008 Mt CO_2 equivalent in 1990 to 0.196 Mt CO_2 equivalent in the year 2000, though this is yet to be verified using the IPCC Guidelines.

79. An ambitious schedule of new plantings is planned for 2003–2012. New plantings on abandoned public land are forecast to increase by 40,000 ha from 2003 to 2012, which signifies an increase of 4,000 ha per year. A further 6,000 ha per year are planned for areas of hydro-geological risk from 2003 to 2012, giving a total of 10,000 ha per year of new plantings in these two types of area.

80. Ancillary benefits from some of the forestry initiatives identified include stimulation of employment in rural areas, reduction in land degradation and stabilization of hydro-geological imbalances.

F. Waste management

81. The waste sector accounted for 2.4 per cent of total GHG emissions in 2000. Emissions increased marginally by 0.8 per cent between 1990 and 2000 and are expected to decline by 45.1 per cent by 2010 under the "trend" scenario.

82. In 2000, 2.32 Mt (8 per cent) of waste was incinerated and 20.97 Mt (72.4 per cent) went to landfill sites. The percentage going to landfill is expected to reach 25 per cent in 2005. The trend is for a gradual increase in biogas from landfill: 7 per cent in 1990, 32 per cent in 2000 and 50 per cent in 2010.

83. EC Directive 99/31/EC outlines a reduction of 50 per cent in biodegradable waste going to landfill in 2011 compared to 1995 levels. Under the "reference" scenario, energy recovery from municipal waste is expected to increase to 200 MWe by 2010.

84. In 2000 there were 43 operating plants using energy from waste. There has been an increase from 282 GWh electricity generation to 1,211 GWh in 2001, in keeping with EC Directive 2000/76/EC which sets allowable limits for emissions to the atmosphere.

85. In relation to EC Directive 99/31/EC, on 13 January 2003 the government established a new decree setting targets of allowable quantities of biodegradable municipal solid waste going to landfill, decreasing from 173 kg per capita per year in March 2008 to less than 81 kg per capita per year in March 2018. From 1 January 2007 there will be a ban on landfill waste having a lower heating value greater than 13 MJ/kg.

86. Additional initiatives planned for the waste sector focus on the stabilization of the organic fraction of waste, and energy recovery from waste. These initiatives also relate to EC Directive 99/31/EC, which calls for a reduction of 50 per cent in the quantity of biodegradable municipal waste going to landfills as early as 2010. Expected emission reductions are forecast to be 0.64 Mt CO_2 equivalent.

IV. PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

87. Many government institutions as well as experts from industry and other sectors are involved in the formulation of the climate policies and at relevant stages of the decision-making process. For this reason, every ministry concerned with sectoral GHG emissions contributes to drafting the mix of policies and measures, and preparing the associated projections and the total effect of policies and measures in that particular sector. The general responsibility for the development of GHG emission projections lies with MATT; technical co-ordination is ensured by APAT, which develops the projection methodology and preparation of sector-specific scenarios with other specialized government departments and agencies, the University of Tuscia and a scientific institution (Fondazione Alma Mater of the University of Bologna).

A. Methodologies and coverage of projections

88. In keeping with the UNFCCC reporting guidelines, the structure of emission sources and the GHGs covered in the projections are consistent with those covered in the inventory, and projections have been prepared for each gas, namely CO_2, CH_4, N_2O, HFCs, PFCs and SF_6. Emissions of individual GHGs are presented in Mt CO_2 equivalent. Projections are presented for the years 2005, 2010, 2015 and 2020 in tabular and graphical format, in summary and by sectors. Projections are also consistent with the 2000 inventory submission.

89. The NC3 contains a complete set of projections for all GHGs for one scenario, namely a "trend" scenario ("with measures") that includes all measures already implemented (before and after the Kyoto agreements, mainly as part of national and EC legislation) and sectoral GHG aggregates for the "reference" scenario ("with additional measures") containing measures already approved or in the pipeline for implementation. The measures included in the "reference" scenario were identified by the national experts as being those for which stakeholders (government, regions, local authorities and the private sector) demonstrated a large degree of willingness for future implementation. Two additional projections scenarios are presented in a general way: (i) "without measures": a "business as usual" scenario, based on the results of projections in the NC2, which are considered by the national team to be only indicative estimates as already implemented measures from the past were not considered; (ii) a "Kyoto objective" or "with additional measures" scenario including other domestic measures necessary to achieve Italy's Kyoto target, which have not yet been approved and have high reduction costs (especially in the transport sector), as well as measures that constitute international implementation of the flexibility mechanisms foreseen under the Kyoto Protocol.

90. Projected emissions from energy use were calculated using the new CEPRIG model (Calculation of Emissions and Policies for the Reduction of Italian GHGs), recently developed by the Fondazione Alma Mater. It was developed for MATT, to enable the preparation of quick energy and climate policy evaluation and scenario runs using different economic parameters. It is a system-dynamic model (not a technology-based model) that analyses historical energy statistics (Italian energy balances 1965–1998) and the effect that certain econometric variables such as energy prices have on energy demand. The model analyses data for seven main energy-consuming sectors (industry, residential, service, agriculture, transport, power, and bunkers) with three main sectoral input variables: activity data

(value added, tonne-km), energy intensity and energy mix (fuel shares, dynamically linked to energy prices), which are calculated on a yearly basis for each energy source in a given sector.

91. The power sector is modelled using a detailed and extensive database of the parameters of Italian power plants, by simulating the energy exchange pool (market) with total domestic energy demand In parallel with CEPRIG, the technology-based MARKAL model is used for energy and emissions calculations, using the same input parameters and data for energy demand by sectors. A comparison of results was presented to the review team, highlighting the differences between the models. The energy demand calculated using the MARKAL model was 6 per cent higher than using the CEPRIG model, given that the MARKAL model results show a higher share of coal and natural gas (strict cost optimization) in its scenarios.

92. Emissions of GHGs from other sources were calculated using sector-specific (spreadsheet) models designed mainly by APAT and other institutions. The reduction potential from measures in these sources is estimated at 8.5 Mt CO_2 equivalent. Although this reduction potential was presented in the NC3, it is not included in either the "trend" or the "reference" scenario. As mentioned earlier, most of this reduction represents a decrease in N_2O emissions from the production of adipic acid with the introduction of abatement technologies (part of a planned voluntary agreement).

93. Projections of GHG emissions from industrial processes were calculated by APAT using future production estimates for industrial subsectors gathered from different industrial sources. Major increases in the production of fluorinated gases are projected. The growth rates are historically high (12 per cent per year) and are projected to rise further to 20 per cent per year by 2010. The largest growth is in HFCs and PFCs, particularly as a result of their use in products where the gases are released into the atmosphere (semiconductors, aerosols, etc.) and increased use of refrigeration and mobile air-conditioning systems.

94. A slight decrease in GHG emissions from agriculture is estimated in both scenarios prepared by APAT. Stabilization of GHG emissions is expected from a slight reduction in cattle numbers (but a possible increase in numbers of pigs and poultry), a small decrease in the use of nitrogen fertilizers and a large increase in organic agriculture (already 91,500 ha in 1993 and 1,069,339 ha in 2000). Additional measures for reduction of CH_4 and N_2O emissions (0.6 Mt CO_2 equivalent) are presented as options in the "Kyoto objective" scenario.

95. For waste and waste-water treatment, the "trend" scenario is in line with the most recent inventories and takes into account the effects of the mitigation measures included in the NC2. The amount of municipal waste produced in Italy is expected to increase from 29.3 Mt in 2001 to 29.7 Mt in 2010. A gradual increase in the amount of biogas collected from landfills (7 per cent in 1990, 32 per cent in 2000 and 50 per cent in 2010) and in the amount of waste collected separately, in line with the targets set (15 per cent by 1999 and 25 per cent by 2001), is expected. The share of municipal waste disposed of in landfills (as primary treatment) is expected to decrease from 72 per cent in 2000 to 13 per cent in 2010, and the amount of waste treated in incinerators with energy recovery is expected to increase by 220,000 tonnes per year.[14] On the basis of current trends, the target of 32.5 per cent of municipal waste treated by incinerators with energy recovery in the year 2010 is hardly achievable. A 20 per cent target seemed more realistic and was used in the projections.

96. Over the projected period, the population is assumed to stabilize by 2010, with growth in the number of households of 0.53–0.75 per cent per year. In the transport sector, annual growth is assumed to be 1.8 per cent for personal travel (passenger-km) and 1.6 per cent for freight (tonnes-km). In all

[14] By 2006, it is estimated that all incineration facilities will be equipped with energy recovery systems.

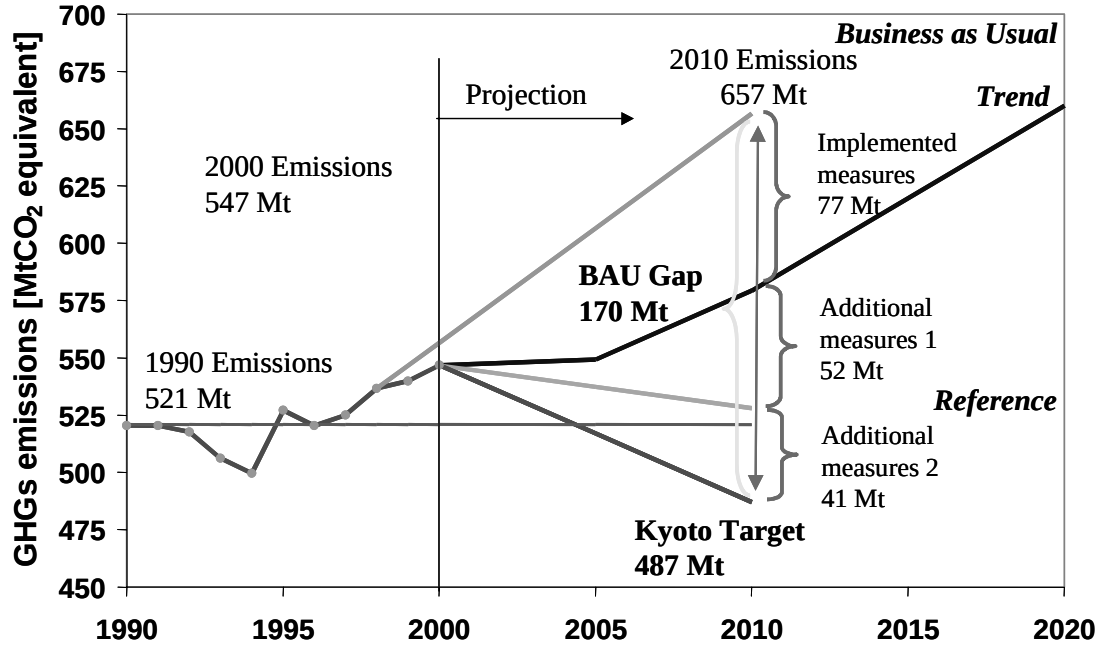
sectors, GDP is estimated to grow at 2 per cent per year. The price of crude oil is set at USD 22/barrel and imported coal at USD 34/tonne; the price of gas is linked to the price of oil, and all other energy prices will remain higher than in other OECD countries. Further development of the energy market is not expected to have a relevant influence. Electricity consumption will grow on average by 2 per cent per year while electricity imports are maintained at their current levels, with an additional 2300 MW of transmission capacity in the "trend" scenario. Assumptions relating to technological development include: improved energy efficiency in the industrial subsector; stable energy intensity for some subsectors (such as mechanical, food and paper production) since they should already have reached minimum levels, whereas a further decrease of about –1 per cent per year is assumed in other sectors; improved insulation and household appliances; and a decrease of about 12 per cent of specific average consumption of passenger cars expected by 2010.

97. Although sinks are only considered as an option for GHG reduction in the "Kyoto objective" scenario, considerable efforts have been made in modelling these emissions. The total estimated 11.3 Mt CO_2 equivalent in possible removals consists of planned intensive reforestation between 2003 and 2008. As noted earlier national experts informed the review team of Italy's intention to request a revision in the expected cap from forest to 4.1 Mt CO_2 equivalent. The current figure of 0.66 Mt CO_2 equivalent results from an underestimate of only 10 per cent of Italy's forests being managed.

98. The CEPRIG model was used to calculate the GHG emissions associated with the energy projections in the "trend" scenario. The "reference" scenario projections were prepared using the results from the "trend" scenario and revising these results exogenously, by applying the estimated GHG emission savings associated with each measure included in the "reference" scenario. A similar approach was used for estimating the reduction potential of the "Kyoto objective" scenario, by introducing the additional measures which have not yet been considered at the national level but which may be substituted by the use of some flexibility mechanisms (only general estimates on total emissions are presented).

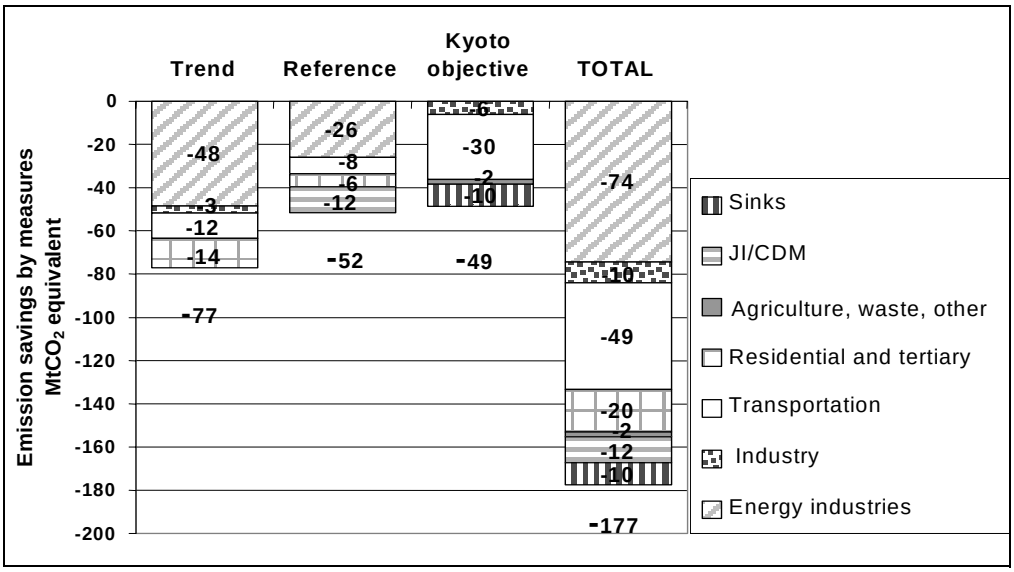
99. Figure 3 presents a graphical representation of the main scenarios. An estimate has been also included for the "without measures" scenario projections depicted as total GHGs, which are considered by the review team to be a good reflection of trends in previous years (before 1998) or business as usual (BAU). Figure 4 illustrates how Italy intends to reduce GHG emissions by 170 Mt to meet its Kyoto target of 487 Mt CO_2 equivalent. Measures under the "trend" scenario are expected to yield 77 Mt CO_2 equivalent reductions while the measures presented under the "reference" scenario, which include some measures already included under the "trend" scenario, are expected to yield an additional 52 Mt CO_2 equivalent. There is a resulting gap of 41 Mt CO_2 equivalent. Discussions on how this will be met through additional measures or by some flexibility mechanisms are on-going.

Figure 3. Italy's target under the Kyoto Protocol and emission reductions potential, by scenario



100. All listed measures grouped for each scenario are well presented and consistently used for calculating the projections to avoid double-counting of some specific measures. Sectoral measures such as CDM/JI implementation, of the order of 12 Mt CO_2 equivalent, were considered in the "reference" scenario and sinks amounting to 10 Mt CO_2 equivalent in the "Kyoto objective" scenario, even though the latter is still subject to CIPE approval.

Figure 4. Potential reductions in GHG emissions, by scenario



101. Table 4 presents a comparison of projections for each scenario by gas. By 2010, CO_2 continues to be the dominant gas while the contribution of N_2O increases and that of CH_4 decreases.

Table 4: Comparison of projections with 1990 and 2000, by gas

	Mt CO_2 equivalent		GHG scenarios Mt CO_2 equivalent		Difference from base year (%)			Difference from year 2000 (%)	
			Trend	Reference[a]		Trend	Reference	Trend	Reference
	Base year[b]	2000	2010	2010	2000	2010	2010	2010	2010
CO_2	439.5	463.4	491.8	440.2	5.4	11.9	0.2	6.1	–5.0
CH_4	39.4	37.8	29.4	29.4	–4.0	–25.4	–25.4	–22.3	–22.3
N_2O	40.8	43.2	43.1	43.1	5.9	5.7	5.7	–0.2	–0.2
HFCs	0.7	2.0	14.1	14.1	192.3	2 001.3	2 001.3	619.0	619.0
PFCs	0.3	0.2	0.7	0.7	–15.2	156.9	156.9	203.0	203.0
SF_6	0.5	0.3	0.7	0.6	–30.2	49.0	27.7	113.6	83.1
Total[c]	**521.1**	**546.9**	**579.7**	**528.1**	**5.0**	**11.3**	**1.4**	**6.0**	**–3.4**

[a] Data provided by national experts during the review week. This data are not presented in the NC3.
[b] The base year is 1990 for CO_2, CH_4 and N_2O, and 1995 for fluorinated gases.
[c] 12 Mt CO_2 equivalent of carbon credits from CDM/JI have already been subtracted.
Discrepancies in totals are due to rounding errors.

B. General comments on GHG emission projections

102. The NC3 meets the requirements of the UNFCCC reporting guidelines on projections. From the information presented, the review team believes that the gap between Italy's target under the Kyoto Protocol and GHG emissions in the "reference" scenario projection could be realistically covered by the listed additional measures implemented domestically as well as those considered to be taken abroad (flexibility mechanisms).

103. The review team commended the parallel use of the CEPRIG and MARKAL models, as this enables comparison and a gives better understanding of projected results. The MARKAL model gives better insight into the effects of technology penetration, whereas the CEPRIG model produces quick results and responses to changes in economic variables. Models used for preparing scenarios for all sectors provide a more consistent way of estimating the summary effect of adopted measures (avoiding possible double-counting of the effects of measures) with their corresponding simulated energy balance, which gives additional information and indicators for possible mixes for future energy policy. The review team believes that further validation and evaluation of the CEPRIG model is necessary to check its reliability, as it is a newly developed modelling tool with no other national or international references.

104. The review team also suggested further improvements of models, methodology and data collection for preparing projections on non-CO_2 GHGs from other sectors. This would reduce the uncertainty of projections (which is now almost 20 per cent of total emissions from such sectors). Inclusion in current modelling methodologies of indirect GHGs (carbon monoxide, nitrogen oxides and non-methane volatile organic compounds, as well as sulphur oxides) should be considered in the future.

105. In 1998–2002, GHG emissions grew by 1.2 per cent per year. Under the "trend" scenario emissions are estimated to grow at 0.6 per cent per year until 2010, half the rate in 1998–2002. Under the "reference" scenario the annual growth rate is negative, at –0.3 per cent per year. In addition, emissions projections after 2010 are rather uncertain given that the annual rate of growth in emissions is expected to increase to 1.3 per cent per year after 2005 as the consumption of energy per unit GDP increases. In other words, the assumption used in the projections, of low elasticity of primary energy to the GDP in the years after 2000, would not hold after 2005. This should be of great concern to the Italian government as it may imply an even greater reliance, than is projected, in the use of flexibility mechanisms to meet its GHG reduction target by 2008–2012.

106. The review team expressed concern regarding the level of implementation of policies and measures to meet the reduction potential estimated in the projections. Given that the bulk of GHG reduction is expected to come from measures implemented in the "trend" scenario, there is a potential risk of slowing the implementation of already approved policies because of budget restraints, lack of human resources, and inability for regional and local policies to be put in place in a timely manner, coupled with putting in place the decrees necessary for the implementation of some policies. An increase of 1.3 per cent in overall GHG emissions between 2000 and 2001 added to the review team's concern. The penetration of renewables was slower than predicted in the NC2, as a result of the slow switch to natural gas in electricity production, market barriers and lack of transmission capacity. Such tendencies present a risk for a decrease in future emissions, especially for the energy sector, which has the highest share of listed measures.

V. VULNERABILITY AND ADAPTATION

107. The NC3 complies in general with the UNFCCC reporting guidelines on vulnerability assessment, climate change impacts and adaptation measures, and is much more comprehensive than the NC2. It assesses the most relevant environmental impacts of the projected climate change in the Mediterranean region on the Italian coastal areas, and on ecological and socio-economic systems. The findings of the *IPCC Third Assessment Report on Vulnerability, Impact and Adaptation (TAR)* are considered, along with the results of research in the fields of vulnerability assessment and adaptation in Italy. The NC3 focuses its assessment on individual sectors, in particular on integrated plans for coastal zone management, water resources and agriculture.

108. A number of government ministries are involved in conducting adaptation activities, with CIPE assuming overall coordination. MATT is responsible for adaptation measures of national importance such as biodiversity, natural reserves, marine environment and assessment of environmental impact. The CTE does not include vulnerability and adaptation on its agenda. Although there is no overall coordinating mechanism for adaptation measures, relevant central ministries, local government and specific authorities work in parallel in their respective areas. There are a variety of laws on vulnerability and adaptation, including presidential decrees, prime ministerial decrees, ministerial decrees, legislative decrees, and inter-ministerial agreements.

109. Since the NC2, there have been many national and regional studies on types of impacts, economic consequences and the implementation of measures. Most studies focus on impacts such as a rise in sea level or changes in temperature and in the water cycle, and their ecological and biological consequences. The NC3 acknowledges the findings of the IPCC TAR that southern Europe, especially the coastal and peripheral areas, is highly vulnerable to climate change.

110. The sectors identified as most vulnerable to climate change are agriculture, forestry, water supply, tourism, human health and the service industries, particularly the insurance sector. The coastal and alpine regions are most vulnerable. An increase in sea level could aggravate damage to infrastructure, property and the tertiary sector in the coastal and lowland regions. In northern Italy soil degradation could take the form of increased erosion due to an increase in rainfall intensity and flooding, while in the south climate change could cause more severe drought, salinization, and nutrient loss. Increase in temperature as a result of climate change is likely to move ecological zones northwards by 40–300 km and upwards by about 100–200 m in the mountainous regions. Human health is expected to be adversely affected, causing an average increase of 27 deaths per annum across Italy if summer mean temperatures rise by 1ºC.

111. Several actions have been undertaken in recent decades to adapt to climate change. The Mose Plan in Venice is one of Italy's most notable measures to mitigate the impact of sea-level rises. The

Mose is a complex system of 79 steel dams, 30 m high, which will be completed by 2013. After 20 years of debate, the EUR 5 billion project was officially approved by the Italian government, the Veneto Region and the Municipality of Venice in April 2003. The project will separate the Adriatic Sea from the Venetian lagoon to protect Venice from flooding at high tide. Another notable initiative is the National Action Plan to Combat Desertification, approved in 1999, which requires regions and river basin authorities to identify the most vulnerable areas and define strategies for prevention, mitigation and adaptation.

112. In the agricultural sector there have been several studies on the implementation of adaptation measures, on management of seeding and harvesting methods and on allocation of water resources. The results indicate that even moderate adaptation policies may considerably reduce agricultural damage caused by climate change. Correct market signals are cited as being important in modifying human behaviour for implementing appropriate adaptation strategies. The review team noted that many vulnerable sectors, such as tourism and hydroelectric power generation, are under private management, and additional support from the public sector may be required to assist them in addressing the challenges of climate change.

VI. FINANCIAL RESOURCES AND TECHNOLOGY TRANSFER

113. In comparison with the NC2, this chapter of the report is more comprehensive and generally complies with the UNFCCC guidelines in terms of content and format. MATT manages bilateral environmental projects. The Ministry of Foreign Affairs and the Ministry of Education, University and Scientific Research (MEURS) also arrange bilateral agreements promoting scientific and technological co-operation with developing counties and countries with economies in transition (EIT). The Ministry of Industry and Trade (now the Ministry of Productive Activities) finances scientific and technological co-operation programmes in the energy sector. The private sector is also active in the transfer of low-impact technologies and implementation of projects on integrated resource management.

114. Italy's NC3 does not define "new and additional" financial resources. The national experts explained the difficulties encountered in the overall calculation of funds earmarked specifically for climate change, but underlined that new and additional resources are those made available in the environmental sector resulting from the ratification of the Kyoto Protocol. The expenditure for preparatory actions relating to the flexibility mechanisms and national policies and measures before the national ratification law of the Kyoto Protocol was approved, is similarly considered new and additional. These financial resources come mainly from the carbon tax. Contributions to the replenishment of the Global Environment Facility (GEF) are also considered new and additional resources dealing with global environmental issues.

115. The Italian Government announced at the World Summit on Sustainable Development in Johannesburg that part of the foreign direct investment by Italian companies would be deducted from tax payments and used for capacity-building in developing countries. In 2002, Italy committed USD 90.5 million to the second replenishment of the GEF (1999–2002). With a 4.4 per cent share of total contributions to the GEF, Italy ranks sixth among contributing countries.

116. Overall, Italy's official development assistance (ODA) fell to a level of 0.13 per cent of GNP in 2000. The government has committed itself to meeting the EC goal of 0.33 per cent of GNP by 2006 and indicated its intention to further increase its ODA to 1.0 per cent of GNP at a later date.

117. Priority actions under ODA follow not only the general criteria set out in the Development Co-operation Law 49/1987 but also the policy guidelines at governmental level. Assistance relating to climate change comes into the category of environmental protection under these guidelines.

118. Between 1997 and 2000, Italy committed financial resources through bilateral and multilateral institutions and programmes, including the World Bank, the GEF, multilateral regional development banks, the United Nations Convention to Combat Desertification, Food and Agriculture Organisation, IFAD, Convention on Biological Diversity, and the United Nations Environment Programme. As a member of the Trilateral Commission for the Protection of the Upper Adriatic and Coastal Areas, MATT provided support in 1999 for Croatia and Slovenia. The geographic coverage of projects is notable. Italy supplied funding for projects relating to climate change in the Mediterranean area, the Middle East, North and Sub-Saharan Africa, Central and South America, Eastern Europe, South-East Asia and China. These projects are well documented in the NC3. Many of the recipients are in developing countries that are particularly vulnerable to the impacts of climate change, including the least developed African countries.

119. Most of the measures taken to promote, facilitate and finance the transfer of environmentally sound technologies are public sector initiatives. Through co-financing schemes with the World Bank, GEF and regional development banks, support was provided to reinforce the technical and institutional capacity for meeting the objective of the UNFCCC. One good example is the co-operation with China in 1999 towards sustainable development, where EUR 14.5 million was disbursed for improvements in energy efficiency, promotion of renewable energy, sustainable agriculture and water conservation. Such co-operation is likely to have a noticeable impact on reducing CO_2 emissions.

120. Bilateral and regional contributions relating to the implementation of the Convention for the period between 1997 and 2000 show mixed trends. The number of beneficiary countries increased from 14 in 1997 to 18 in 1998 and to over 30 in 1999 and 2000. The total amount of financial resources allocated varied from USD 6 million in 1997/8 to USD 22.4 million in 1999 and less than USD 4.4 million in 2000. The total amount of resources for recipient countries varied from USD 2,000 to over USD 10 million. Under bilateral arrangements, the proportion of financial aid relating to the implementation of the Convention ranged from 0.6 per cent to 3.5 per cent. Capacity-building has been the priority; about half of the total projects include it exclusively or as part of the overall objectives. Agriculture and water resources are the major sectors for adaptation to climate change. The Italian government has also cooperated with developing countries in training and research on climate change impacts and adaptation.

121. In many cases, grants to each country have more than one component in order to reflect the Italian emphasis on effective co-operation with several international environmental institutions and promotion of the integration of activities under various regional and global environmental conventions.

122. Bilateral and regional assistance to EIT countries targeted mainly the Balkan region, including Albania, Bosnia and Herzegovina, Croatia, Slovenia, Serbia and Montenegro. Capacity-building was the major component, except for Albania where the focus is on forestry. A few EIT countries also received support for agriculture.

VII. RESEARCH AND SYSTEMATIC OBSERVATION

123. The review team noted remarkable progress in reporting on this topic compared to the NC2. The NC3 contains a comprehensive description of the research activities carried out through a large number of national programmes and by many organisations, as well as international initiatives under the umbrella of the EC, the World Climate Programme, the International Geosphere-Biosphere Programme, the Global Climate Observing System and the IPCC.

124. A number of government agencies and research organisations are actively involved in climate change research. At the government level, MATT and MEURS research centres play a leading role,

while other government bodies participate in related areas, for instance the Ministry of Agriculture on forestry policy, the Meteorological Service of the Italian Air Force on meteorology and the Ministry of Foreign Affairs in supporting international research initiatives. Many public institutions are also involved in climate research programmes.[15] In addition to domestic sources, the EC is a major source of funding for research programmes in Italy. Research programmes cover mainly the sciences of climate change and to a lesser extent climate vulnerability, impacts and adaptation. In comparison with the NC2, considerable progress has been made in the area of socio-economic aspects of climate change, with new initiatives on economic investigations in progress.

125. After three years of work the National Research Plan on Climate was prepared in 2002 by MATT, MEURS, the Ministry of Agriculture and several universities and research centres. Funding for this plan amounted to EUR 27 million. The review of the proposals submitted through a call of the National Research Plan on Climate is underway. Another new initiative in January 2003 was the establishment of the Euro-Mediterranean Centre for Research on Climate Change with funding of EUR 27 million, to support the Italian strategic programme Sustainable Development and Climate Change. Decree 381/1999 established a new research organisation, the National Institute of Geophysics and Volcanology (INGV), with a special focus on the scientific aspects of climate change and carbon sequestration using a geo-engineering approach.

126. Italy continues to be a strong leader in climate science and impact research in the Mediterranean region. The Italian National Research Plan on Climate consists of a comprehensive series of activities concerning climate observations, climate global and regional modelling, climate impacts and vulnerability. In particular the research activities in the last years also focused at domestic level on strengthening a monitoring network on climate change using advanced instruments for data collection and analysis, including a number of oceanographic vessels used for research voyages. Italian research groups are active and well established in numerical simulation of climate through the development and use of ocean circulation models, global atmospheric models, atmospheric-ocean general circulation models, regional climate modelling systems and the like. A few research programmes are directed at impact, adaptation and socio-economic factors but they are not as systematic and large in scale as those on the science of climate change.

VIII. EDUCATION AND PUBLIC AWARENESS

127. The NC3 reports on these issues comprehensively and in general it meets the reporting requirements. It lists Italy's participation in international efforts as well as domestic activities.

128. Although MEURS has primary responsibility for formal education and training, MATT takes a leading role in promoting and funding environment-related education, training and raising of public awareness. Other players include local government, NGOs and the mass media.

129. Increasingly, education on environment and climate issues depends on decisions autonomously taken by schools and universities at the regional level. However, in 1999, CIPE established a three-year information programme on climate change which contains a number of effective actions that have been taken by Italian institutions since the NC2, including the dissemination of information on their work in climate change by central ministries, local authorities, the private sector and NGOs. Notably, a climate museum was established in Arenzano in 2002 for public information and awareness raising. Italy has

[15] These include the National Research Council (CNR), in particular the Institute of Atmospheric and Climate Sciences (ISAC), APAT, the Italian Agency for New Technologies, Energy and Environment (ENEA), the Italian Electro-Technical Experimental Centre (CESI), the National Institute for Geophysics and Volcanology (INGV), the Italian Institute of Agrarian Economy (INEA) and a number of Italian universities.

also made progress on environmental information, access to this information and public participation, with the creation of a National Environmental Information and Monitoring System (SINAnet) in 2002.

130. Italian-based international NGOs, local environmental NGOs and associations launched a series of climate campaigns aimed at specific groups for actions and at the general public for awareness on negotiations under the UNFCCC between 1999 and 2001. Since 2000 they have also been engaged in educational efforts at secondary school level for actions to reduce GHG emissions. In 1999–2002, WWF Italy undertook a series of activities addressing climate change, including public campaigns, exhibitions, publications and establishment of an ethical fund for the climate.

131. A few commendable examples of public participation in developing policies and measures are highlighted in the NC3. The Italian coordinating committee for Local Agenda 21, in co-operation with APAT and ENEA, undertook surveys on climate change activities. MATT funded and promoted competitions on climate change issues. Meetings were arranged between the government and NGOs before the ninth Conference of the Parties in Milan (December 2003) for consultation and communication. Legambiente, the Italian Environment League, organized a petition on climate protection, which was sent to the G8 meeting in Genoa in July 2001.

132. However, there is no indication in NC3 whether and how the contribution by the general public is fed back into the process of developing policies and measures. The impact of public campaigns on raising awareness can be derived from the surveys mentioned above, although the results are not reported in the NC3. Using the evaluation method developed in collaboration with ENEA, for instance, Amici della Terra estimates that the schools selected for the educational campaign could help in reducing their CO_2 emissions by as much as 17 per cent of their 1990 levels by 2010. But overall there is limited information on systematic assessment of such impacts.

IX. CONCLUSIONS

133. Italy's NC3 represents a considerable improvement over its NC2. It follows the UNFCCC reporting guidelines and is, in general, a well-prepared and comprehensive document. The most notable improvements are a detailed discussion of inventory trends and the application of a new modelling methodology (CEPRIG) which has a number of innovative features: it integrates all major elements relating to GHGs at both macroeconomic and sectoral level within one modelling framework; and it provides a prompt response on the implications for GHGs of changes in policy options to meet GHG targets. The NC3 has also expanded its presentation of vulnerability and adaptation issues in Italy and is more consistent with the guidelines for financial resources and technology transfer.

134. Some areas for further improvement were identified. The review team noted that any specific inventory improvement programme is hindered by a lack of resources. It was also noted during the review week that Italy fell short of fully implementing the IPCC good practice guidance, which should have been fully implemented by Annex I Parties by the end of 2003. However, subsequent to the review, a full set of CRF tables (1990–2002) was provided to the secretariat. An evaluation of costs for GHG mitigation measures would have been useful in determining the extent to which flexibility mechanisms under the Kyoto Protocol may be used in the future, as this will be determined by the cost of domestic policies and measures.

135. Between 1990 and 2000 overall emissions (excluding LUCF) increased by 6.9 per cent, from 509 to 544 Mt CO_2 equivalent. Within the EC burden-sharing agreement for the Kyoto Protocol, Italy is required to reduce its GHG emissions in the period 2008–2012 by 6.5 per cent compared to its 1990 emissions. It must reduce GHG emissions by 93 Mt to meet its Kyoto target of 487 Mt CO_2 equivalent. Although the growth in emissions from year to year decreased between 1990 and 2000, the

review team believes that the implementation of policies and measures will have to be intensified to meet this target. Measures under the "trend" scenario are expected to yield reductions of 77 Mt CO_2 equivalent, while the measures presented under the "reference" scenario are expected to yield 52 Mt CO_2 equivalent. It is still unclear how the resulting gap of 41 Mt CO_2 equivalent will be filled. Some of this 41 Mt will come from sinks (10 Mt CO_2 equivalent) and from CDM/JI initiatives (12 Mt CO_2 equivalent).

136. Since the NC2, Italy has strengthened its overall framework for climate change policy. In 2002 CIPE approved the National Action Plan for 2003–2010 for the reduction of GHG emissions, as well as the Revised Guidelines for National Policies and Measures Regarding the Reduction of Greenhouse Gas Emissions, outlining the government's strategy to reduce emissions by 2012. In addition, both the budget and the staffing of MATT have increased to meet the needs of the new plan. New directorates have also been established in MATT to address, among other things, sustainable development and flood protection. An inter-ministerial working group was set up in 2002 to implement Italy's commitments under the Kyoto Protocol. The CTE was created in 2002 to monitor progress in implementation of domestic policies and measures and decide on additional measures to reach the Kyoto target on the basis of a cost-effectiveness analysis.

137. The sectors identified as most vulnerable to climate change are agriculture, forestry, water supply, tourism, human health and the service industries, in particular the insurance sector. Although a national programme for adaptation to climate change is not yet in place, there are a variety of laws on vulnerability and adaptation.

138. Currently, Italy's ODA amounts to about 0.13 per cent of its GNP. The government has committed itself to meeting the EC goal of 0.33 per cent of GNP by 2006 and indicated its intention to further increase its ODA to 1.0 per cent of GNP at a later date. A recent innovation by the government was to allocate part of the taxes collected from foreign direct investments by Italian companies to capacity-building efforts in developing countries.

139. Italy continues to be a strong leader in climate science and impact research in the Mediterranean region. A National Research Plan on Climate was prepared in 2002 by MATT, with funding of EUR 38 million. Another new initiative in January 2003 was the establishment of the Euro-Mediterranean Centre for Research on Climate Change with funding of EUR 7 million, to support the strategic programme Sustainable Development and Climate Change.

140. Education and public awareness has increased in Italy with the establishment of a three-year information programme on climate change which includes the dissemination of information by central ministries on their work in climate change, by local authorities, the private sector and NGOs, and a National Environmental Information and Monitoring System (SINAnet) in 2002.

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