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Report of the review of the initial report of Italy

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the " initial report") to facilitate the calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of Italy conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of Italy, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 4 to 9 June 2007 in Rome, Italy, and was conducted by the following team of nominated experts from the roster of experts: generalist – Mr. Ignacio Sánchez García (Spain); energy – Mr. Hugh Saddler (Australia); industrial processes – Ms. Sina Wartmann (Germany); agriculture – Ms. Janka Szemesová (Slovakia); land use, land-use change and forestry (LULUCF) – Mr. Nijavalli Ravindranath (India); waste – Ms. Irina Yesserkepova (Kazakhstan). Mr. Ignacio Sánchez García and Mr. Nijavalli Ravindranath were the lead reviewers. In addition, the expert review team (ERT) reviewed the national system, the national registry, and the calculations of the Party's assigned amount and commitment period reserve (CPR), and took note of the LULUCF parameters and the elected Article 3, paragraph 4 activities. The review was coordinated by Mr. Javier Hanna Figueroa (UNFCCC secretariat).

2. In accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1), a draft version of this report was communicated to the Government of Italy, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Summary

1. Timeliness

3. Decision 13/CMP.1 requests Parties to submit the initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. The initial report of Italy was submitted on 19 December 2006, which is in compliance with decision 13/CMP.1. With the initial report Italy submitted a revised greenhouse gas (GHG) inventory compared to its original 2006 GHG inventory submission of 18 April 2006 for the common reporting format (CRF) tables and 6 June for the national inventory report (NIR). In addition an addendum to the NIR was provided by Italy on 13 April 2007. Italy submitted further explanations, documentation and revised emission estimates on 19 July 2007 in response to questions raised by the ERT during the course of the in-country review, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP1).

2. Completeness

4. Table 1 below provides information on the mandatory elements that have been included in the initial report and revised calculations for the assigned amount and CPR provided by Italy as a result of the review process. These revised calculations are based on new emission estimates of methane (CH_4) and nitrous oxide (N_2O) from stationary combustion, N_2O from flaring and N_2O from wastewater handling (see paragraphs 54, 56, 57 and 106), which resulted in revisions of the total GHG emissions, including base year emissions from 519,464,323 tonnes carbon dioxide (CO_2) equivalent as reported originally by Italy to 516,850,887 tonnes CO_2 eq. (see paragraphs 110 and 111).

5. The information in the initial report covers all elements as required by decision 13/CMP.1, section I of the decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP).

6. Italy's inventory covers all gases, sectors and main categories for the whole time series 1990–2004 and for the entire territory of the country. Only potential emissions of perfluorocarbons

(PFCs) from consumption of halocarbons and SF_6 are not reported. Emissions and removals from wetlands and other land categories were not estimated ("NE"), based on the assumption that these are not occurring. The information included in the NIR and CRF tables is generally complete.

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year (1990) to the most recent year available (2004)	Yes	Base year: 1990
Base year for HFCs, PFCs and SF_6	Yes	1990
Agreement under Article 4	Yes	93.5%
LULUCF parameters	Yes	Minimum tree crown cover: 10% Minimum land area: 0.5 ha Minimum tree height: 5 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities	Yes	Forest management Commitment period accounting
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	2 428 495 710 tonnes CO_2 eq.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8, revised estimate		2 416 277 898 tonnes CO_2 eq.
Calculation of the commitment period reserve	Yes	2 185 646 139 tonnes CO_2 eq.
Calculation of the commitment period reserve, revised estimate		2 174 650 108 tonnes CO_2 eq.
Description of national system in accordance with the guidelines for national systems under Article 5, paragraph 1	Yes	
Description of national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the COP/MOP	Yes	

3. Transparency

7. The initial report is generally transparent with clear descriptions of the individual components of the national system, national registry, activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, and the calculation of the assigned amount and CPR. Regarding the NIR there are a few cases identified by the ERT where transparency could be further improved. These exceptions mainly relate to justification of decisions on the choice of activity data (AD), emissions factors (EFs) and other parameters based on expert judgements and the rationale behind recalculations. In a few cases methodologies and data are not sufficiently detailed in the NIR, as specified in the inventory-related sections of this report.

4. Emission profile in the base year, trends and emission reduction target

8. In the base year (1990 for CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), PFCs, and sulphur hexafluoride (SF_6)), the most important GHG in Italy was CO_2 contributing 84.1 per cent to total[1] national GHG emissions expressed in CO_2 eq.,[2] followed by CH_4, 8.0 per cent and N_2O, 7.4 per cent, see figure 1. HFCs, PFCs and SF_6 taken together contributed 0.5 per cent of the overall GHG emissions in the base year. The energy sector accounted for 81.2 per cent of the total GHG emissions in the base year followed by agriculture, 7.9 per cent, industrial processes, 7.1 per cent, waste, 3.5 per cent, and solvent

[1] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 eq. excluding LULUCF, unless otherwise specified.

[2] In this report, the values for total and sectoral emissions for the complete time series, and in particular in the base year and in 2004 reflect the revised estimates submitted by Italy in the course of the review. These estimates differ from Italy's GHG inventory submitted in 2006.

and other product use, 0.5 per cent, see figure 2. Total GHG emissions (excluding LULUCF) amounted to 516,850.89 Gg CO_2 eq. in the base year and to 578,114.60 Gg CO_2 eq. in 2004, thus increasing by 11.9 per cent from the base year to 2004. Emissions increased in all sectors, except solvent and other product use and agriculture. The trends in GHG emissions from the sectors are based on the country-specific circumstances and are generally well documented in the NIR.

Figure 1. Shares of gases in total GHG emissions, base year

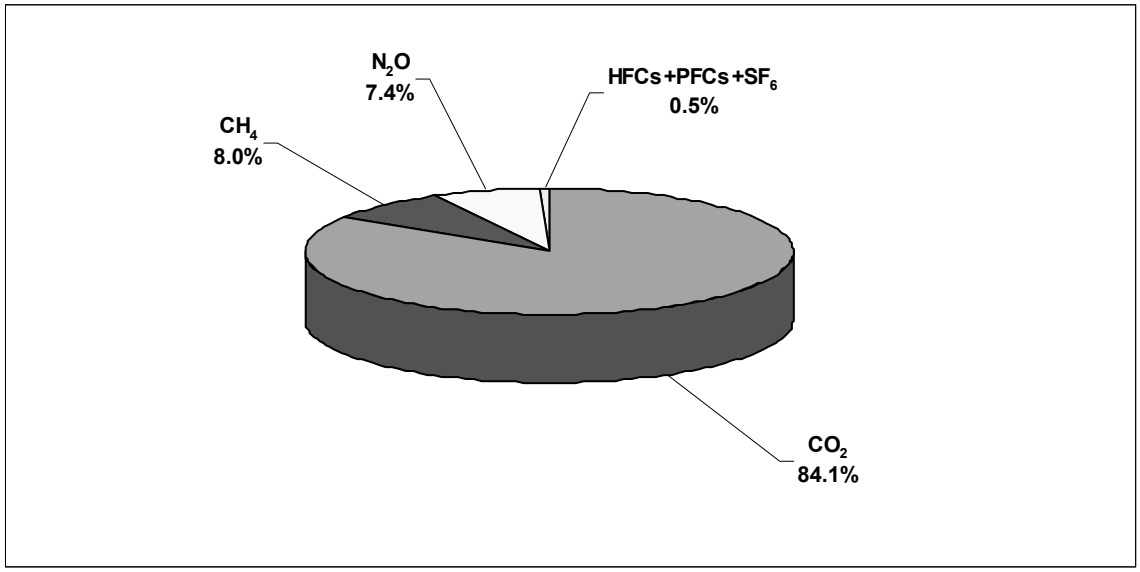
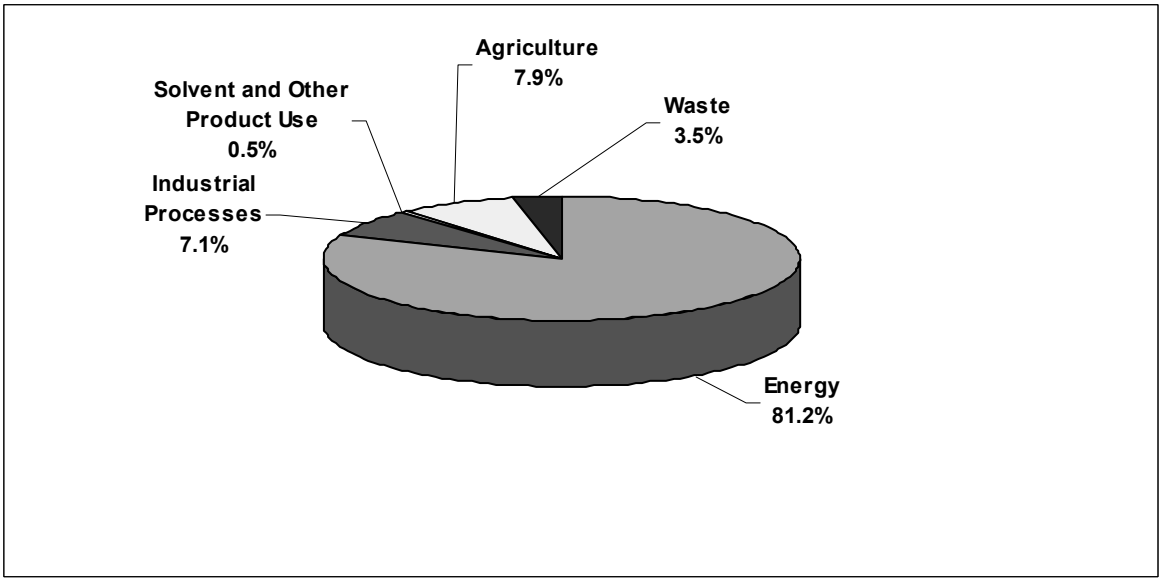


Figure 2. Shares of sectors in total GHG emissions, base year



9. Tables 2 and 3 show the GHG emissions by gas and by sector, respectively.

10. Italy's quantified emission limitation is 92 per cent, as included in Annex B to the Kyoto Protocol. As Italy is part of the European Community, whose member states will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, Italy's quantified emission limitation is 93.5 per cent. Italy's assigned amount is calculated based on the Party's Article 4 commitment.

Table 2. Greenhouse gas emissions by gas, 1990–2004

GHG emissions without LULUCF	Gg CO_2 eq.								Change
	Base year Kyoto Protocol[a]	1990[a]	1995[a]	2000[a]	2001[a]	2002[a]	2003[a]	2004[a]	KP BY – 2004 (%)
CO_2	434 781.95	434 781.95	445 714.27	463 598.01	469 319.73	471 157.71	486 462.78	489 918.23	12.7
CH_4	41 568.75	41 568.75	44 069.52	44 288.63	43 274.82	41 696.57	41 035.12	39 885.98	–4.0
N_2O	38 008.60	38 008.60	38 740.14	40 873.92	41 227.87	40 713.12	40 135.10	41 602.10	9.5
HFCs	351.00	351.00	671.29	2 005.50	2 761.41	3 568.02	4 589.89	5 699.29	1 523.7
PFCs	1 807.65	1 807.65	490.80	345.85	452.37	413.58	484.46	406.62	–77.5
SF_6	332.92	332.92	601.45	493.43	795.34	738.35	485.63	602.38	80.9

Note: BY = Base year; LULUCF = Land use, land-use change and forestry.

[a] Italy submitted revised estimates for the complete time series in the course of the initial review on 19 July 2007. These estimates differ from Italy's GHG inventory submitted in 2006.

Table 3. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO_2 eq.								Change
	Base year Kyoto Protocol[a]	1990[a]	1995[a]	2000[a]	2001[a]	2002[a]	2003[a]	2004[a]	KP BY – 2004 (%)
Energy	419, 460.89	419 460.89	432 512.65	452 756.73	457 455.40	459 423.14	473 960.10	476 706.63	13.6
Industrial processes	36 544.50	36 544.50	34 589.69	34 979.32	37 206.40	37 460.46	38 955.40	41 982.44	14.9
Solvent and other product use	2 394.46	2 394.46	2 181.88	2 297.40	2 220.68	2 229.58	2 178.66	2 124.31	–11.3
Agriculture	40 577.10	40 577.10	40 349.18	39 928.53	39 421.27	38 221.72	37 840.53	37 838.56	–6.7
LULUCF	NA	–79 721.59	–103 206.42	–97 476.45	–110 156.09	–114 334.99	–111 340.95	–105 107.49	NA
Waste	17 873.93	17 873.93	20 654.10	21 643.36	21 527.79	20 952.45	20 258.28	19 462.66	8.9
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	437 129.30	427 081.06	454 128.89	447 675.45	443 952.36	461 852.03	473 007.12	NA
Total (without LULUCF)	516 850.89	516 850.89	530 287.49	551 605.34	557 831.53	558 287.35	573 192.98	578 114.60	11.9

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable.

[a] Italy submitted revised estimates for the complete time series in the course of the initial review on 19 July 2007. These estimates differ from Italy's GHG inventory submitted in 2006.

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic GHG emissions by sources and sinks

11. Italy's national system is generally prepared in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). The ERT considers it able to perform most of the general and specific functions that are required by the guidelines. Italy's implementation of its national system results in an inventory of high quality, since all tasks relating to inventory planning, preparation and management are properly performed at present. However, as discussed in paragraphs 13–17 below, during the in-country review the ERT noted that Italy's national system has to be improved regarding some legal, institutional and procedural arrangements that should be further developed. In response to these concerns, within the six-week period set in the guidelines for reporting under Article 8 of the Kyoto Protocol, Italy provided documentation showing that these further developments are already in progress.

12. Table 4 shows which of the specific functions of the national system are included and described in the initial report.

Table 4. Summary of reporting on the specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	Yes	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control plan*	Yes	See section II.A.5
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with IPCC guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factors collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.5
Source/sink category-specific QC (tier 2) procedures implemented	No	See section II.A.5
Basic review by experts not involved in inventory	Partially	See section II.A.5
Extensive review for key categories	Partially	See section II.A.5
Periodic internal review of inventory preparation	Partially	See section II.A.5
Inventory management		
Archive inventory information*	Yes	See section II.A.6
Archive at single location	Yes	See section II.A.6
Provide ERT with access to archived information*	Yes	See section II.A.6
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

13. Italy explained the institutional arrangements, as part of the national system, for preparation of the inventory within the initial report and provided further details on the existing institutional, legal and procedural arrangement during the in-country review. The Agency for the Protection of the Environment and for Technical Services (APAT) is functioning as a designated single national entity, since the process of its final designation is not finalized. Other ministries, agencies and organizations are also involved in

the preparation of the inventory through the collection of AD; they have defined and allocated specific responsibilities for the inventory development process as part of the National Statistical System (Sistan), which provides national official statistics. The system is coordinated by the Italian National Statistical Institute (ISTAT), whereas other bodies belonging to Sistan are the statistical offices of ministries, national agencies, regions and autonomous provinces, provinces, municipalities, research institutes, chambers of commerce, local government offices, some private agencies and private subjects who have specific characteristics determined by law. After receipt of the AD from Sistan, APAT is responsible for all inventory-related activities as specified in the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). APAT chooses methods and EFs, calculates estimates, implements quality assurance/quality control (QA/QC) procedures and archives the inventory information. The overall organization of the national system is effective and reliable for estimating GHG emissions.

14. The ERT considers the existing capacities and competence of the technical staff to be of high quality, allowing timely performance of the national system functions. The ERT noted that the system worked well during the review and Italy provided responses to requests for clarifying inventory information resulting from the different stages of the review process, and information on the national system. However, the ERT noted that Italy's national system has to be improved regarding some legal, institutional and procedural arrangements that should be further developed to ensure sustainability of existing capacities and competence of technical staff, to improve collection of input data in some specific areas, for example, LULUCF, and to ensure future reporting of supplementary information related to activities under article 3, paragraphs 3 and 4, of the Kyoto Protocol. In the course of the review, Italy provided information to the ERT showing that it is already taking measures to ensure the maintenance of existing capacities over time. In particular, APAT has recently elaborated a three-year plan to stabilize short-term staffing. The ERT encourages Italy to implement this plan as soon as is practicable.

15. Although APAT performs all the functions of a single national entity in relation to the national system under the Kyoto Protocol, during the in-country review the process of its official designation by the Ministry for the Environment, Land and Sea as such had not been finalized. The ERT recommended that Italy expedite the process of formalization of APAT as the single national entity. Italy then informed the ERT that this process had already been launched, and provided the ERT with a draft ministerial directive that will regulate this issue. The ERT encourages Italy to speed up and finalize the ongoing legal proceedings as soon as possible.

16. The Italian Ministry for the Environment, Land and Sea endorses the national inventory after preparation by APAT. However, there is no formal process in Italy for the official consideration and approval of the inventory, including recalculations, prior to its submission and for responding to any issues raised by the inventory review in accordance with decision 13/CMP.1. During the review, the ERT recommended that Italy formalize the process for the official approval of the inventory. Italy properly responded to requests for further clarification during the review. Furthermore, Italy informed the ERT that the ministerial directive referred to in paragraph 15 will also address the process for the inventory approval. Again, the ERT welcomes this information and invites Italy to finalize ongoing procedures as soon as possible and report on them in its future inventory submission under the Kyoto Protocol.

17. The institutional arrangements regarding future reporting of activities under article 3, paragraphs 3 and 4, of the Kyoto Protocol were not addressed in detail within the initial report. During the review, the ERT recommended that Italy provide information regarding potential institutional arrangements and remote sensing or other techniques to be adopted in relation to this issue. In response to the suggestions of the ERT, the Italian team has presented information on the institutional arrangements and instruments regarding the implementation of activities under Articles 3.3 (afforestation/reforestation and deforestation) and 3.4 (forest management), which are considered to be satisfactory by the ERT. The main elements of the institutional arrangement are:

(a) Setting up activities under Articles 3.3 and 3.4 of the reporting system, namely the National Registry for Forest Carbon Sinks, that is composed of the following four tools (a technical description of each instrument is reported in the annex to the APAT document, "National Greenhouse Gas Inventory System in Italy" (July 2007)), submitted by Italy as additional documentation after the in-country review:

(i) The National Land-Use Inventory (IUTI), aimed at identifying and quantifying forest land areas, land areas in conversion from forest land (since 31 December 1989) and land areas in conversion to forest land (since 31 December 1989);

(ii) The National Inventory of Carbon Stocks (ISCI), aimed at quantifying carbon stocks and carbon stock changes in each land-use category, during the first commitment period of the Kyoto Protocol;

(iii) The National Census of Forest Fires (CIFI), aimed at identifying and quantifying forest land areas affected by fires;

(iv) The National Inventory of non-CO_2 emissions from Forest Fires (IEIF) aimed at quantifying non-CO_2 emissions from forest land areas affected by fires;

(b) Setting up a specific unit to manage the activities of the National Registry for Forest Carbon Sinks, with adequate human resources and administrative support;

(c) Setting up a scientific committee to support the design and implementation of the activities related to the National Registry for Forest Carbon Sinks. The committee involves all major national, regional and local institutions in charge of carbon cycle studies, inventories and monitoring.

18. Italy informed the ERT that formal procedures to adopt the institutional arrangements and instruments regarding the implementation of Articles 3, paragraphs 3 and 4, of the Kyoto Protocol are ongoing and a specific work programme is under finalization with a budget of €4 million. The ERT recommends that Italy finalize these procedures in time to comply with all reporting requirements under Articles 3, paragraphs 3 and 4, of the Kyoto Protocol.

2. Quality assurance/quality control

19. Italy has elaborated and implemented a QA/QC system in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC good practice guidance). It has developed a QA/QC manual with procedures that are applied every year for all sectors and a QA/QC plan with additional annual activities. Most QA/QC activities are carried out by APAT staff. QC procedures included in the manual are comprehensive, including both tier 1 and tier 2 QC procedures. However, only tier 1 procedures are applied at present. The ERT recommends that Italy apply source-specific QC procedures for its next submission.

20. In addition, specific panels on quality have been established for all the main economic sectors in the context of Sistan. These panels verify the quality of AD used to estimate the emissions of several inventory categories. The ERT also recommends that Italy better explain in its next NIR the activities of Sistan's panels on quality, given their role in ensuring the quality of AD provided by external institutions.

21. Although no full independent review of the inventory is applied before submission of the inventory, Italy carries out several QA activities in different contexts: presenting the inventory to the technical committee on emissions; involving national expert panels (road transportation, land use, land-use change and forestry, and energy production) in inventory preparation; and applying voluntary

European Community reviews. The ERT encourages Italy to make arrangements for an independent review of the inventory.

3. Inventory management

22. Italy has a centralized archiving system, which includes the archiving of disaggregated EFs, AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, internal and external reviews, documentation on annual key categories and key category identification, and planned inventory improvements.

23. A database, "documentation catalogue", has been implemented to facilitate searches of all documentation related to the inventory, including calculation worksheets, background documentation, QA/QC procedures, and so on. Some components of the archive which are not available electronically, such as scientific papers, are also kept in hard copy, their location being specified in the database.

24. The archiving system is managed by APAT. During the review, Italy was able to provide any additional information requested by the ERT in the archives. In addition, the ERT was granted direct access to the documentation catalogue.

B. Greenhouse gas inventory

25. In conjunction with its initial report, Italy submitted a complete set of CRF tables for the years 1990–2004 and an NIR. An addendum to the NIR, which was provided at a later date (13 April 2007), was also considered by the ERT. After the in-country review, Italy submitted revised CRF tables for the years 1990–2004 on 19 July 2007 in response to questions raised by the ERT during the course of the in-country review.

26. During the review Italy provided the ERT with additional sources of information. These documents are not part of the initial report submission, but are in many cases referenced in the NIR. The full list of materials used during the review is provided in the annex to this report.

1. Key categories

27. Italy has reported key category tier 1 and tier 2 analyses for both level and trend assessments as part of its 2006 inventory submission. The analyses were performed both with and without the LULUCF sector. During the review, Italy explained that a qualitative approach does not result in additional key categories in the case of Italy. The results of the key category analysis are a driving factor for the preparation of the inventory, particularly in the prioritization of resources and methodological complexity.

28. Italy does not provide a key category analysis for the base year, either in the CRF or in the NIR. The secretariat's analysis identified 24 key categories in 1990, among them CO_2 – limestone and dolomite use and N_2O – nitric acid production. Both Italy's and the secretariat's analyses conclude that they are no longer key in 2004. The ERT recommends that Italy also include in its next inventory submission a key category analysis for the base year.

29. The key category analysis for 2004 performed by Italy and the secretariat[3] produced similar results. CO_2 emissions from stationary combustion − other fuels, and N_2O emissions from land converted to cropland are identified by the secretariat but not by Italy, as a consequence of a different level of disaggregation of categories. On the other hand, Italy's tier 2 analysis results in some additional categories that were not identified by the secretariat, such as CO_2 – land converted to settlements, N_2O – animal production and CH_4 – wastewater handling.

2. Cross-cutting topics

30. The inventory is in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

31. The inventory is generally compiled in accordance with Article 7, paragraph 1, and decision 15/CMP.1. While the inventory is in general of high quality and in a continuous process of improvement, there are some areas where further improvements are still needed. These areas refer mainly to a better documentation of decision-making and the collection of AD in some specific areas, such as the LULUCF sector. In addition, the ERT identified some cases where the methods and EFs used are not fully in line with the guidance indicated above. These cases are identified in the respective sectoral sections of this report below. The ERT also acknowledges that these problems were corrected during the review. The ERT recommends that Italy reflect these improvements and changes in its next inventory submission.

Completeness

32. Italy's inventory covers all gases, sectors and main categories for the whole time series 1990–2004 and for the entire territory of the country. Only potential emissions of PFCs from consumption of halocarbons and SF_6 are not reported. The ERT recommends that Italy report them in its next submission. Emissions and removals from wetlands and other land categories were "NE", based on the assumption that these are not occurring. The ERT recommends that Italy validate the assumption and report on this in its next submission.

33. The information included in the NIR and CRF tables is generally complete. However, CRF table 7 (Summary overview for key categories), and CRF table 8(b), with explanatory information on recalculations, were not filled out in the CRF. Italy explained that this problem was related to the use of different reporting tools in previous submissions. In addition, table 9(a) submitted by Italy does not contain all the necessary explanations. The ERT recommends that Italy provide the above-mentioned tables in its next inventory submission. Table 1.5 in the NIR includes summary tables on completeness. However, this table follows the old category list for the Land-use Change and Forestry (LUCF) sector and is not consistent with the IPCC good practice guidance for LULUCF.

Transparency

34. The ERT appreciates the efforts made by Italy to ensure the transparency of the NIR and the information in the CRF tables. They provide much of the information necessary to assess the inventory and to understand the methodologies and data behind the estimates. Nevertheless, in some cases the descriptions of the methods in the NIR are not sufficient to understand the rationale for choosing

[3] The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) for the base year or base year period as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

particular data, methods and other inventory parameters, for example, the methodology to determine feedstock use and energy flows in the petrochemical industry, the percentage of aerobic/anaerobic wastewater treatment, or uncertainties for EFs and AD. The ERT encourages Italy to make further efforts to fully explain in the NIR methodologies and underlying assumptions and justify the expert judgement used in the elaboration of emission estimates. In addition, the ERT notes that a more intensive use of CRF documentation boxes would improve transparency.

Consistency

35. Italy's GHG inventory is generally consistent, as defined in the UNFCCC "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) and the IPCC good practice guidance. However, there are specific categories where the time-series might not be fully consistent or trend fluctuations are not sufficiently explained in the NIR. Details on such inconsistencies are provided in the sectoral sections. The noted inconsistency is usually due to problems related to AD. Affected categories include PFC emissions from aluminium production, iron and steel, and CH_4 emissions from manure management. The ERT recommends that Italy carefully examine these categories, verify the trend and include in its next NIR more explanations on category-specific trends.

Comparability

36. Italy's GHG inventory is comparable with those of other Parties, as defined in the UNFCCC reporting guidelines. It follows the methodological and reporting formats for estimating and reporting inventories as agreed by the COP. The allocation of the categories follows the split in the Revised 1996 IPCC Guidelines and the IPCCC good practice guidance.

Accuracy

37. Italy's inventory team makes continuous efforts to ensure accurate GHG emission estimates, as defined in the UNFCCC reporting guidelines and the IPCC good practice guidance. In general, the inventory is of high quality and in a continuous process of improvement. It depends extensively on country-specific methods and EFs. However, during the in-country review the ERT identified a few categories where the methods or EFs used were not fully in accordance with the IPCC good practice guidance and could lead to overestimation of emissions in the base year or underestimation of emissions in the most recent year (e.g. CH_4 and N_2O emissions from stationary combustion, N_2O emissions from flaring and N_2O emission from human sewage). The ERT recommends that Italy revise its estimates for these categories. After the in-country review, Italy provided revised estimates for these categories for the complete time series in accordance with the recommendations of the ERT. Further details are provided in the sectoral sections below.

Recalculations

38. The national system can ensure that recalculations of previously submitted estimates of GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance, although the system for their approval has not been formalized. The ERT noted that the 2006 submission recalculations for the time series 1990 to 2003 had been undertaken in a number of categories of the GHG inventory sectors. The major changes, with regard to the recalculation impact in total GHG emissions, are found in categories 5.C, grassland, and 6.C waste incineration. As a result of all recalculations total GHG emissions, excluding LULUCF, increased by 1.6 per cent and 1.0 per cent in 1990 and 2003 respectively. When LULUCF is also considered, decreases of 2.4 per cent and 4.8 per cent in 1990 and 2003, respectively, are observed. The quantitative effects of the recalculations are shown in CRF table 8(a), but there is very little documentation to support this either in the CRF table 8(b) or in the NIR. Most of the changes were explained in the course of the review, and the ERT is fairly

confident that they are appropriate, but providing more complete explanations for these changes, both in CRF table 8(b) and in future NIRs, would increase transparency. The ERT recommends that Italy provide more information on the rationale for recalculations and provide more precise information on the changes made and parameters affected when recalculations take place.

Uncertainties

39. Italy has provided an uncertainty analysis for each category and for the inventory in total, following the IPCC good practice guidance. Italy applied a tier 1 uncertainty analysis both including and excluding the LULUCF sector. In addition, a tier 2 approach, corresponding to the application of the Monte Carlo analysis, has been applied to specific categories of the inventory. The uncertainty levels for AD are based on default IPCC values, empirical data and expert judgment. For most sectors, uncertainty of EFs is derived from empirical data. Expert judgement is used to decide on the final value, taking into account all available information. The resulting overall uncertainly level of the inventory is comparatively low, 3.3 per cent without LULUCF and 8.3 per cent with LULUCF. However, the uncertainty for the LULUCF sector is high, having a combined uncertainty of above 50 per cent both for the total emissions and trend, showing the need for improvements in this sector.

40. The ERT recommends that Italy further use its uncertainty analysis to prioritize improvements in the inventory. The ERT notes that the growing amount of data available at plant level could be used to develop more sound AD uncertainties or to support values used so far.

3. Areas for further improvement identified by the Party

41. The NIR identifies several areas for improvement of the GHG inventories, the main priority being the completion of a national system. For several categories, Italy is expected to have updated AD, EFs or other inventory parameters. An independent review of the inventory is under consideration.

4. Areas for further improvement identified by the ERT

42. The ERT identifies the following cross-cutting issues for improvement:

(a) Provide all CRF tables, including those relating to key category analysis and explanatory information on recalculations;

(b) Provide the key category analysis for the base year;

(c) Improve transparency on decisions based on expert judgment, explanations of methodologies and underlying assumptions in the elaboration of emission estimates, and the rationale behind recalculations in the next NIR;

(d) Implement source-specific QA/QC procedures.

43. Recommended improvements relating to specific source/sink categories are presented in the relevant sector sections of this report.

5. Energy

Sector overview

44. The energy sector is the most important contributor of GHG emissions in Italy. In the Kyoto Protocol base year (1990) GHG emissions from the sector amounted to 419,460.89 Gg and 81.2 per cent of total emissions. Since the base year, GHG emissions from the sector increased in 2004 by 13.6 per cent. Fuel combustion accounts for most of the energy sector emissions (408,723.97 Gg CO_2 eq. or 97.4 per cent of base year energy sector emissions) and increased by 14.7 per cent in 2004. Fugitive emissions accounted for 10,736.92 Gg in the base year and decreased by 27.0 per cent in 2004.

45. Trends in fuel combustion over the period 1990–2004 indicate an overall increase by 19.9 per cent for energy industries, 27.6 per cent for transport and 10.4 per cent for other sectors. Only emissions from manufacturing industries and construction decreased over the inventory period (3.9 per cent). Taken together, energy industries and transport contributed 46.2 per cent and 50.9 per cent of total emissions in the base year and 2004, respectively, and 91 per cent of the increase in total emissions since the base year. The time series for emissions in the sector is consistent and the trends are closely related to the observed external factors affecting activity levels, including the severity of winter weather, levels of economic activity, and changes in particular industries with intensive emissions levels.

46. The estimates and reporting of the energy sector are of high quality and are transparent, complete, comparable and consistent, with major categories reported in all years with all respective gases. In particular, consistent AD values covering production, imports and exports of coal, crude oil, petroleum products and natural gas are collected and used by the Ministry of Economic Development to compile the national energy balance (Bilancio Energetico Nazionale (BEN)), and Italy combines these with national emission CO_2 EFs based on test data for all fossil fuels, except coal, used by the iron and steel industry. Consequently, estimations for total energy combustion CO_2 emissions have high accuracy. Italy uses default uncertainty ranges in the uncertainty analysis for these sources, which may in fact overestimate the real level of uncertainty. Italy also has very detailed data on fuel consumption and EFs for electricity generation.

47. Transparency could be increased by including in the NIR some description of methodologies used in particular areas where data and methodology are in fact very good. Examples include feedstock use and energy flows in the petrochemical industry (see paragraph 51), the comprehensive data and model used to calculate emissions from off-road mobile equipment, and the comprehensive data and systematic reconciliation with the waste sector of emissions from waste incinerators with energy recovery.

48. Recalculations made since the 2005 submission have affected emission estimates for all three gases (CO_2, CH_4 and N_2O) in many categories other than those discussed in paragraph 54 below. As in the other sectors, the transparency of the inventory will benefit from including more information on the NIR and table 8(a) on the rationale and the changes made. As an example, the ERT has identified a lack of transparency regarding recalculations between the 2005 and 2006 inventory submissions, including the base year, of CO_2 estimates from liquid fuels from source category 1.A.2.c chemicals.

Reference and sectoral approaches

Comparison of the reference approach with the sectoral approach and international statistics

49. CO_2 emissions from fuel combustion have been calculated using both the reference and the sectoral approaches. The reconciliation between estimates of CO_2 emissions using the reference and sectoral approaches is consistently very close. The reference approach estimate of CO_2 is consistently less than the sectoral approach, but the difference is less than 2 per cent in all but a few years during the time series (1991, 1995, 1998, 1999, 2001). It is 1.4 per cent in the base year and 0.9 per cent in 2004. The comparison of the fuel consumption reported in the CRF with international statistics shows that these figures are close, but consistently higher compared to the IEA data.

International bunker fuels

50. Italy does not collect the data which would be needed to separate fuels used for domestic and international aviation and shipping at the points where the fuel is supplied to aircraft and ships. Italy uses models based on comprehensive origin and destination data for both aviation and shipping in 1999 to estimate fuel used by international flights and sea voyages in all years. The ERT considers that this is satisfactory for the base year. However, Italy considers, and the ERT agrees, that this approach may

overestimate the share of domestic aviation in recent years. This issue is currently being comprehensively addressed by a new study, which it is hoped will lead to the construction of a model using data available annually, so that in future the fuel allocation between domestic and international aviation can be recalculated each year. The ERT recommends that efforts be made to have the new data available for the 2008 submission. The ERT agrees with Italy in assessing that re-examining the split between domestic and international for shipping is a lower priority because, unlike aviation, there have not been great changes in the relative number of sea voyages on different routes over recent years.

Feedstocks and non-energy use of fuels

51. Italy collects comprehensive data on complex energy flows in the petrochemical sector and between petrochemical industries and oil refineries, together with complete data on quantities of all major petrochemical products. This allows a complete mass balance of carbon in the petrochemical sector to be constructed, providing a high degree of accuracy for this part of the inventory. Transparency would be improved by including a brief description of this methodology in the next NIR.

Key categories

Stationary combustion: solid fuels – CO_2

52. The estimate of CO_2 emissions from the iron and steel industry has in principle been greatly improved by the use of a new methodology which constructs a full carbon mass balance for integrated steelworks, reconciling energy flows with the BEN. The steelworks include coke ovens (source category 1.A.1.c, manufacture of solid fuels and other energy industries), blast furnaces and other steel-making plants (source category 1.A.2.a, iron and steel) and electricity generating plants, typically fuelled by blast furnaces and/or coke oven gas (source category 1.A.1.a, public electricity and heat production). The new methodology has resulted in the recalculation of emissions from solid fuel combustion in these three source categories and the allocation of emissions between the source categories, which has in principle greatly improved inventory quality. This resulted in an increase in emissions in the base year, compared with the 2005 submission, of 2,817 Gg.

53. The time series of AD and IEFs for this source now show a high degree of consistency. However, the time series of changes resulting from the recalculation is not consistent for all years; there is a large increase in the base year and subsequent years up to 1994, but for most years from 1995 onwards there are large decreases. When the ERT examined the AD and emissions reported for the same categories in the 2005 submission, it noted large discontinuities in the time series. It therefore concluded that the apparent discontinuity of changes is caused by one or more discontinuities in the methodology used in the previous submission. Nevertheless, it notes that transparency would be increased by providing a more complete explanation of the changes in all years in the next NIR. The ERT assesses the increase in base year emissions between the 2005 and 2006 submissions to be justified.

Stationary combustion: solid, liquid and gaseous fuels – N_2O

54. This is a key category, accounting for 1.4 per cent of total emissions in the base year. In the course of the in-country review, it was noted that IEFs for N_2O from all stationary combustion emission sources were generally much higher than the IPCC default values (0.1 kg/TJ for gaseous fuels, 0.6 kg/TJ for liquid fuels and 1.4 kg/TJ for solid fuels). The ERT recommended that the choice of EF values be reviewed and revised, if necessary, or that full documentation be provided to support the chosen higher values. After the in-country review, in response to these comments, Italy reviewed all EFs for N_2O (including other fuels and biomass) and provided revised estimates for N_2O emissions from stationary combustion that used EFs from a variety of reference sources, mainly using default values from the IPCC good practice guidance and the EMEP CORINAIR Guidebook. Full documentation was provided with regard to the sources used and the reasons for the choice of sources and values. The ERT considers that Italy's estimates of N_2O emissions from stationary combustion are now consistent with best practices,

and notes that the effect of the revision reduced N_2O emission estimates by 10.68 Gg (3,309.45 Gg of CO_2 eq.) in the base year, with the revised estimate being 11.08 Gg of N_2O.

Oil and natural gas – CO_2 and CH_4

55. Italy uses a combination of default and country-specific EFs and tier 1 and tier 2 methodologies for estimating fugitive emissions from oil and natural gas. More complete data on fugitive emissions from flaring at oil refineries was provided by the operating companies, based on the environmental reports of oil refining companies, in time for the 2006 GHG inventory submission. Therefore, Italy recalculated estimates for the time series 1990–2004, as described in the addendum to the NIR, dated April 2007. During the review, Italy informed the ERT that companies have provided further additional, more detailed data that could be used for the 2007 submission. The ERT recommends that Italy assess the quality of these data and recalculate the time series if it is in accordance with the IPCC good practice guidance.

Non-key categories

Stationary combustion: biomass – CH_4

56. During the in-country review the ERT noted that the implied emission factor (IEF) for CH_4 from biomass combustion in 1.A.1 energy industries and 1.A.2 manufacturing industries and construction was very high (320 kg/TJ), and appeared to be the value appropriate for fuel wood used in residential appliances (stoves) rather than large boilers. The ERT recommended that emissions from these categories be revised for the base year and all other years using the corrected emission factor (30 kg/TJ). After the in-country review, Italy provided revised estimates for these categories, which used the IPCC default EF value (30 kg/TJ). This had the effect of reducing total estimated CH_4 emissions for these categories by 5.92 Gg (124.25 Gg of CO_2 eq.) in the base year, with the revised estimate being 0.75 Gg of CH_4.

Oil and natural gas – N_2O

57. During the review the ERT noted that N_2O emissions from flaring were reported as "NE", and for the sake of completeness of the inventory and given the availability of AD, the ERT recommended including an estimate using the IPCC default EF. After the in-country review, Italy included this estimate following the recommendation of the ERT. The impact of this new estimate on the overall emissions of the country was an increase of 0.0038 Gg of N_2O (1.17 Gg of CO_2 eq.) in the base year.

6. Industrial processes and solvent and other product use

Sector overview

58. In the Kyoto Protocol base year (1990), the industrial processes sector accounted for 7.1 per cent of total national emissions and solvent and other product use for 0.5 per cent. Industrial processes emissions decreased up to the mid-nineties and have been increasing ever since. A total increase in emissions of 14.9 per cent occurred between 1990 and 2004. Total national emissions have been increasing at a similar rate. The main drivers of the development of emissions in the industrial processes sector are CO_2 emissions from mineral products, chemical industry and metal production categories as well as N_2O from the chemical industry. Emissions of the major categories of the solvent and other product use sector (CO_2 from paint application, CO_2 from degreasing and dry cleaning, CO_2 from other − glue and adhesives and CO_2 from other − domestic use of solvent) have been steadily decreasing through the whole time series (11.3 per cent). The emission trends are well documented within the NIR for these sectors.

59. The inventory for the industrial processes sector is complete. All categories are reported in the base year, except for the potential emissions of PFCs. Italy informed the ERT during the in-country review that these emissions will be included in its next submission.

60. Estimation approaches, data availability, recalculations and documentation are in general very transparently presented in the NIR. In some cases, to add transparency, additional explanatory information could be included in the NIR regarding rationale for applied recalculations or information on peculiarities in the IEF trends, such as changes due to plant closures or process changes, for example, in the case of nitric acid or aluminium production.

61. Estimation methods are broadly in line with the IPCC good practice guidance. The ERT welcomes the work of Italy's inventory team to develop country-specific EFs and to use plant-specific data in the sector. The estimates in the sector in the 2006 submission have improved due to the recalculations using tier 2 approaches for a number of key categories, such as plant-specific data from the European Pollutant Emission Register (EPER) database, and also partly from the European Union emission trading scheme (EU ETS) which have become available, and direct contacts with operators that have been established. This is the case for lime production, ammonia production and adipic acid production. Applied recalculations (e.g. lime production, limestone and dolomite use, ammonia production) were consistently introduced for the whole time series. The ERT recommends that additional contacts with plants be established, that existing contacts be formalized and that all EU ETS data relevant for the inventory be used for its compilation.

62. QA/QC are carried out through validation of national statistics data by cross-checking with EPER-data and, where available, with previous relevant emission data. In the ERT's view some internal documentation (e.g. excel worksheets) regarding the estimation approaches or data references (e.g. in the case of aluminium production) could be improved. The ERT recommends that data sources and parameters used for calculation of emissions always be documented in such a way that they allow the estimates to be reproduced without explanation of the excel worksheets by the author. For the uncertainties calculation, IPCC default values are mainly used. The ERT recommends deriving specific uncertainty values from plant-specific data used in Italy's next submission.

Key categories

Cement production – CO_2

63. Italy uses a tier 2 approach for estimating CO_2 emissions from cement production. AD is clinker production, taken from the National Statistical System. An average EF is used (540 kg CO_2/ton clinker) for the entire time series, which is based on industry information and has also been applied in the EU ETS allocation plan for Italy. The EF is based on the average calcium oxide (CaO) content in the clinker and taking into account the contribution of carbonates and additives. The approach is consistently applied for the complete time-series.

Lime production – CO_2

64. CO_2 emissions from lime production have been estimated on the basis of production AD supplied by the National Statistical System. Plant-specific EFs have been received from the EU ETS allocation plan for Italy. Emissions have been recalculated for the whole time-series based on the additional production data from smaller plants, which only became available under the EU ETS.

Ammonia production – CO_2

65. AD taken from international statistical yearbooks are checked against data in the national EPER registry. An EF equalling 1.175 t CO_2/t ammonia production has been calculated on the basis of information reported by the production plants for 2002 and 2003 in the framework of the national EPER registry and applied to the years 1990−2001. As no modifications to the production plants have occurred

over the period 1990–2002, the 2002–2003 values were assumed to be representative. EFs for 2002–2004 resulted from plant data annually reported to EPER. Natural gas is used as feedstock in the ammonia production plants and the amount of fuel used is reconciled with the figures reported in the energy sector. The ERT recommends that Italy also verify emission data published in the EPER registry based on the amounts of natural gas used as production input in ammonia plants.

Adipic acid production – N_2O

66. While the production in other chemical industries in Italy decreased during the period 1990–2004, it increased by 58.1 per cent for adipic acid production. AD as well as emission data were provided by the plant operators. The resulting emission factor of 0.30 kg N_2O/kg adipic acid, equalling the IPCC default EF, was used for 1990–2003. Abatement technology was implemented at the end of 2004.

Iron and steel production – CO_2

67. For estimations of CO_2 emissions in the iron and steel production category the IPCC default method and country-specific EF values (e.g. 0.15 t CO_2/t pig iron production in the base year) are applied. Data on carbonates used in sinter plants was received directly from the plant operators mainly within the framework of the EU ETS allocation plan for Italy. The average EF for steel production in electric arc furnaces (0.035 t CO_2/t steel production) has been calculated based on industry data applied to equation 3.6B of the IPCC good practice guidance and including pig iron and steel scraps and graphite electrodes used in the furnace.

Solvent and other product use – CO_2 and N_2O

68. CO_2 emissions from solvents and other product use and N_2O emissions from anaesthesia and aerosol cans are identified as key categories only in the key category analysis of Italy (tier 2 level and trend assessment). CO_2 emissions from solvents have been calculated by using a bottom-up approach based on national and EMEP/CORINAIR NMVOC EFs for the various applications and AD taken from the EPER registry (e.g. solvent use in paint application, dry cleaning, textile finishing, and tanning industries), trade associations and national statistics. Emissions are calculated based on AD from national statistics in the case of anaesthesia (number of surgical beds), and production data supplied by the Italian Association of Aerosol Producers in the case of aerosol cans. An assumption of 100 per cent emission of N_2O is used.

Non-key sources

Aluminium production – PFCs

69. PFCs from aluminium production was not a key category by level in 1990, but it is a key category in terms of trend assessment. PFCs emissions from aluminium production are estimated using a tier 1 methodology for 1990–1999 and a tier 2 methodology for 2000–2004. For the tier 1 methodology, AD stem from national and international statistics and IPCC default EFs for CF_4 and C_2F_6 are used. The consistent application of tier 2 for the complete time series was considered, but found to be impossible due to lack of information following several plant closures and renovations in the 1990s. At the same time, further application of the tier 1 methodology was found to underestimate 2000–2004 emissions. Splicing techniques as recommended by the IPCC good practice guidance were not found to be useful in this specific case. This is due to the fact that technology changes in aluminium production can lead to a reduction or increase in emissions and are totally dependent on the technologies used before and after the changes. The ERT took note of the inconsistency, and considers the estimates to be transparent, accurate and conservative, particularly for the base year.

7. Agriculture

Sector overview

70. In the Kyoto Protocol base year (1990), Italy's GHG emissions from the agriculture sector were estimated to be 40,557.1 Gg CO_2 eq. By 2004 they had decreased by 6.7 per cent to 37,838.6 Gg CO_2 eq., mainly due to a reduction in the cattle population and reductions in emissions from agricultural soils. The share of emissions from the agriculture sector in total national emissions also decreased from 7.9 per cent in the base year to 6.5 per cent in 2004.

71. In the base year, N_2O emissions from the agriculture sector accounted for 61.5 per cent of the total N_2O national emissions and CH_4 emissions accounted for 41.4 per cent of total CH_4 national emissions. Emissions from enteric fermentation in the base year accounted for 30.0 per cent, manure management for 18.2 per cent, and agricultural soils for 47.9 per cent of total sectoral emissions. The remaining 3.9 per cent of emissions were derived from rice cultivation and field burning of agricultural residues. The CRF tables for the base year include estimates of all gases and categories of emissions from the agriculture sector, as recommended by the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The NIR states that the emissions from the application of sewage sludge to agricultural soils are included in the estimates of emissions from sewage sludge reported under the waste sector.

72. During the in-country review, Italy clarified that it used three different sources of AD provided by ISTAT collected using different approaches and providing different levels of detail, the most comprehensive being the 10-year Agricultural Census of 2000. The ERT recommends that Italy in its next NIR improve explanations on decisions with regard to the use and choice of data sources, especially for the base year. The ERT believes that a consistent dataset should be used to avoid increasing the uncertainty of the estimates.

73. In the case of manure management – dairy cattle category, Italy does not use dynamic country-specific EFs across the time series, but a constant EF based on country-specific parameters. The ERT encourages Italy to make further efforts to develop dynamic country-specific EFs across the time series for dairy cattle and to take into account available statistical information in line with the IPCC good practice guidance.

74. The NIR and its addendum are transparent. However, the agriculture sector could be further improved by including a time series of livestock population, statistical data on crops and information on fertilizers applied to soil in an appendix to the report. Further information in the NIR explaining the trend fluctuations and justifying country-specific parameters used would further enhance the overall transparency of the reporting within the sector.

75. As a follow-up to the previous (2005) review, in the original 2006 submission Italy carried out recalculations of the estimates of CH_4 from enteric fermentation (1.3 per cent decrease), CH_4 and N_2O from manure management (–14 and 2.4 per cent change, respectively), CH_4 from rice cultivation (1.5 per cent increase), and N_2O from agricultural soils (3.0 per cent increase) for the base year. The overall result of the recalculations is a decrease in GHG emissions from the sector in the base year by 0.1 per cent. The reasons for the recalculation are provided in the NIR and its addendum. However, the ERT recommends further attention to the documentation of conducted recalculations in the sector, including further details on methodological changes and justification of these changes.

76. The ERT welcomes the efforts Italy has made in improving estimates from the agriculture sector, in particular the work undertaken within the framework of the MeditAIRaneo[4] project. The ERT encourages further implementation of the QA/QC plan in the sector and further steps to improve

[4] Project supported by APAT to produce reliable GHG inventories in Mediterranean countries, through the exchange of information.

uncertainty analyses and documentation of verification processes from peer-review. The ERT was impressed, and commends Italy's excellent electronic and paper archives of AD and other source references for the agriculture sector.

Key categories

Enteric fermentation – CH_4

77. Italy uses a tier 2 methodology for estimating CH_4 emissions from enteric fermentation for significant livestock categories, dairy, non-dairy cattle and buffalo, together with country-specific EFs. Emissions from all other livestock categories are estimated using a tier 1 methodology. The ERT encourages Italy to make further efforts to apply a tier 2 methodology for the sheep population since its contribution to the emissions is significant (12.1 per cent total CH_4 emissions from enteric fermentation in 1990). For the estimates Italy uses AD as reported in the various publications of ISTAT. In case of different AD sources, data are further reconstructed by APAT. The ERT advises that Italy clearly specify the data sources, the criteria for their choice, the way the AD are collected and the influence of the AD trend on the emissions in its next NIR.

Manure management – CH_4

78. Italy uses a tier 2 methodology for cattle, buffalo and swine along with country-specific and default EFs in estimating CH_4 emissions from manure management. For the estimation of slurry and solid manure management a new methodological approach was developed by Italy that provided updated time series for slurry and manure production, conversion factors and EFs for cattle and buffalo.

79. The ERT welcomes improvement of transparency in the NIR and increasing accuracy in EFs for cattle, buffalo and swine. The ERT recommends that Italy apply the same information for the animal population split across all categories in the agriculture sector in its next submission, since currently different levels of aggregation for cattle are applied in enteric fermentation and manure management.

Manure management – N_2O

80. Italy has estimated N_2O emissions from manure management using equation 4.18 of the IPCC good practice guidance, and has applied country-specific nitrogen (N) excretion rates per livestock category and country-specific fractions of manure deposited to each manure management system. N_2O emissions are estimated using the default IPCC EFs for each animal waste management system (AWMS). Italy uses a country-specific N excretion rate for swine calculated as an average value of country-specific N excretion rates for sub-categories (sows and other swine). The ERT considers the information provided to be appropriate but recommends that Italy improve the transparency of its reporting by providing the necessary background information and data for the time series in its next NIR. The ERT also recommends that Italy reconsider the use of notation keys in CRF table 4.B(b), for example, for other AWMS (chicken-dung drying system) for poultry for the period 1990−1994, where not applicable ("NA") should be replaced with the appropriate notation key.

Direct soil emissions – N_2O

81. The IPCC default tier 1a methodology and default EFs have been used to estimate direct N_2O emissions from agricultural soils. Italy has compiled estimates of emissions from synthetic fertilizers, animal manure applied to soils, N-fixing crops, crop residue and cultivation of histosols. The ERT encourages Italy to develop country-specific EFs according the available country-specific data of N sources.

Pasture, range and paddock manure – N_2O

82. Italy uses a country-specific value for the fraction of livestock N excretion and deposition onto soil during grazing ($Frac_{GRAZ}$) of 19 per cent. N excreted in pasture, range and paddocks as a percentage of total N excretion, as calculated from the data in table 4.B(b), equals 19 per cent, in accordance with $Frac_{GRAZ}$ value. The percentage of N excreted during grazing varies between animal categories from 5 per cent for dairy cattle to 90 per cent for sheep and goats. The ERT welcomes the consistency of Italy's reporting approach.

Indirect soil emissions – N_2O

83. Italy estimates emissions of N_2O from atmospheric deposition and from leaching and run-off using the IPCC default methodology and EFs for this key category. Italy developed a country-specific fraction of N input to soils that is lost through leaching and run-off ($Frac_{LEACH}$) of 0.3 kg N_2O -N/kg N comparable to the IPCC default value and uses country-specific fraction of livestock N excretion that volatilizes as NH_3 and NO_X ($Frac_{GASM}$) (0.32 in 1990) and a fraction of synthetic fertilizer N applied to soils that volatilizes as NH_3 and NO_X ($Frac_{GASF}$) (0.083 in 1990) in estimating indirect emissions of N_2O from soils. The ERT welcomes the efforts made by Italy to develop country-specific parameters and recommends that Italy improve documentation on how the country-specific parameters were developed in its next NIR.

Non-key categories

Rice cultivation – CH_4

84. Following the recommendation of the 2005 review report, Italy has improved and developed country-specific methodology and national EFs for rice cultivation. Even though the country-specific EFs are lower than default IPCC EFs, Italy justified the methodological choice and other aspects of recalculations made in the NIR. The change of the methodology is not reflected in the uncertainty analysis and the ERT recommends updating uncertainty values for country-specific EFs and AD (e.g. irrigated area) reflecting the revised methodology in Italy's next NIR.

Field burning of agricultural residues – CH_4 and N_2O

85. Italy estimates emissions of CH_4 and N_2O for this category assuming that 10 per cent of the cereal residues (50 per cent for rice) are burned on-site.

86. The ERT welcomes Italy's efforts to estimate emissions from this category, considering that the activity is illegal in the country and that data are difficult to collect. The ERT recommends that Italy estimate emissions only from regions where this activity takes place as farming practice for its next submission.

8. Land use, land-use change and forestry

Sector overview

87. In 1990, the LULUCF sector was a net sink of 79,721.59 Gg CO_2 offsetting 15.4 per cent of Italy's total GHG emissions. CO_2 dominates sectoral estimates of emissions and removals. Estimates are reported for forest land, cropland and settlements covering the entire time series. For the base year emissions from grassland, wetlands and other land categories are not estimated and the notation key "not occurring" ("NO") is used across the relevant CRF tables.

88. A combination of tier 1 and tier 2 methods was used in the sector for all land categories, except for category 5.A forest land, where the growth model was applied to forest inventory data. The estimates for the sector are affected by the lack of more frequent collection of AD (only 1985 and 2005 forest inventories are available). However, the data from the new National Forest Inventory (2005) are

expected to fill in this gap for the next GHG inventory. A positive sign in this direction is the initiation of the use of remote sensing data in land use estimation and monitoring, and of research projects on carbon inventories. Methodological details for estimations are adequately provided in the NIR.

89. Forest land is the dominant category accounting for 73.7 per cent of the net removals of the sector during 1990. Italy has developed a land-use change matrix describing the changes in land area covering categories based on national land use statistics. However, the annual transitions between land categories are derived based on assumptions. It is assumed that new forest areas and settlement areas have come from cropland or grassland. Given the importance of these changes in land categories, the ERT suggests that Italy validate these assumptions in its next NIR, based on forest inventory and periodic remote sensing data.

90. In terms of completeness and transparency of the sector, all the CRF tables for LULUCF have been reported, using notation keys in the places where emissions are not provided. The NIR provides information for all land categories, sub-categories and all carbon pools and adequately describes the methods and procedures applied.

91. Since the emission and removal estimates in the sector are based on many assumptions, these need further validation, based on forest inventories and periodic remote sensing data (that are already planned by Italy). In addition, the uncertainly level for the sector is rather high (88.3 per cent for 1990) and efforts are needed to improve the estimates. This may require validation of the models used and the use of updated inventory data.

Key categories

Forest land remaining forest land – CO_2

92. The estimation of CO_2 emissions and removals for 1990 was calculated through a linear interpolation between the 1985 and 2002 data. Forest land remaining forest land is reported to be a net sink of 45,510.06 Gg during 1990. Emission estimates were made by using a model based on growing stock values. The ERT appreciates the details provided about the model and data sources in the NIR. The annual carbon stock changes were estimated using the 1985 forest inventory stock data and the Richards Function. The soil, litter and dead wood estimates are based on the estimates of above-ground biomass and thus most crucial for the inventory of the sector. The equations are given for linking litter and soil carbon to above-ground biomass. The ERT suggests validating the estimates made using the Richards Function and the equations used for estimating litter and soil carbon. Italy is encouraged to provide the standard error of estimates for the coefficients used and the coefficient of determination (R^2) in its next NIR which would help in better understanding of the estimates, though in the current submission equations and related uncertainties are reported.

Land converted to forest land – CO_2

93. An increase in forest area is reported for all years. For the base year forest area increased by 117.56 kha, and this is assumed to have come from grassland conversion to forest land. Land converted to forest is reported to be a net sink of 13,435.65 Gg. The ERT suggests that Italy validate this increase, if possible with other information, such as remote sensing or other documentation and to report on this in its next NIR. Carbon stock changes are estimated using consistent methodology (combination of tier 1 and tier 2) for all years 1990 to 2004. The soil carbon estimate is linked to above-ground biomass stock for 1990 using a linear relation model. Italy is encouraged to provide the standard error of estimates for the coefficients used and the coefficient of determination (R^2) in its next NIR which would help in better understanding of the estimates, though in the current submission equations and related uncertainties are reported.

Cropland remaining cropland – CO_2

94. CO_2 estimates for cropland remaining cropland cover living biomass, dead organic matter and soils. Removals from cropland remaining cropland are reported for perennial crops. Soil carbon changes are reported as zero for annual and perennial crops. A high biomass carbon accumulation rate of 2.10 t C/ha/year is considered for living biomass although there is not adequate documentation in the NIR to support such a rate. The ERT recommends that Italy provide the source of data used, and validate reported values for soils with field studies, or refer to any published studies, and include the results in the next submission.

Non-key categories

Land converted to cropland – CO_2

95. For the base year grassland is reported as being converted to cropland (14.80 kha). Estimates of carbon stock change cover only living biomass, since there was not sufficient information to estimate carbon stock change in the dead organic matter pool. Changes in soil carbon stocks associated with the transitions have been estimated only for a single year. In CRF table 5.B carbon loss in soils of 5.78 t C/ha during the year of conversion is reported. The ERT considers that this value needs to be supported by documentation in the next NIR. The ERT also appreciates planned improvements which include the estimation of carbon losses from above-ground biomass from perennial woody crops, which currently are not estimated due to lack data, and the planned research aiming to collect more country-specific data on woody crops. Improvements will also aim at estimation of carbon change in cropland biomass at a higher disaggregate level, with the subdivision of the AD in the main categories of woody cropland (orchards, citrus trees, vineyards, olive groves) and the application of different biomass accumulation rates and harvest/maturity cycles for the various categories.

Grassland and wetlands – CO_2

96. Emissions and removals are not reported for grassland and wetlands for the complete time series, although the AD for grasslands remaining grasslands and wetlands remaining wetlands are provided in the CRF tables. Conversions of lands are reported as "NO". This assumption needs validation in the light of the need to report changes in soil carbon stock for grasslands remaining grassland. There is a need for clarification on the extent of flooded lands. The ERT recommends that Italy include this information in its next NIR. During the in-country review, Italy informed the ERT that it plans to obtain such data.

Settlements – CO_2

97. Grassland conversion to settlements is reported for the complete time series using a constant value for the area converted (8.26 kha). The ERT considers the rate of loss of soil carbon (42.28 t C/ha) reported by Italy to be rather high and recommends that it be validated with literature values in its next NIR. The ERT further recommends specifying in the NIR whether the carbon stock change in farms, parks and gardens are reported within this category. The ERT appreciates the planned improvements in obtaining estimates of carbon stock changes in dead organic matter for land in transition to settlements.

Biomass burning – CH_4 and N_2O

98. Emissions from biomass burning are reported only for forest land remaining forest land. For all other categories the notation key "NO" has been used. Only CH_4 and N_2O emissions from wildfires in forests are reported for biomass burning, since CO_2 emissions are considered to be covered under forest land remaining forest land. The IPCC default method and EFs are used for the estimates. The area subjected to biomass burning during 1990 is reported to be 96,157 ha. The amount of grassland area converted to cropland is reported to be 14,800 ha. The ERT suggests that Italy report whether any burning is involved during the process of this conversion leading to emissions of CH_4 and N_2O.

Land converted to cropland – N_2O

99. N_2O emissions from land use conversions resulting from the conversion of grassland to cropland are reported in CRF table 5.A. The secretariat identified this category as key in the trend analysis. The area undergoing a transition from grassland to cropland is estimated to be 14,800 ha in 1990. Emissions of N_2O from mineral soils, resulting from the land use conversion are reported to be 0.11 Gg for the year 1990. The ERT suggests that Italy use a locally-derived C/N ratio, rather than a default value for its estimations in its future submissions.

9. Waste

Sector overview

100. In the Kyoto Protocol base year (1990), waste sector emissions amounted to 17,873.93 Gg CO_2 eq. and contributed 3.5 per cent of total national GHG emissions. Emissions from this sector in 2004 were 8.9 per cent above the base year level. The trend is entirely defined by CH_4 emissions from solid waste disposal on land (SWDL) which also increased by 8.9 per cent between 1990 and 2004 and contributed 74.4 per cent to the total emissions from the waste sector both in the base year and in 2004. The methodology used by Italy is in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

101. The base year inventory covers all gases and all categories. Additionally, CH_4 emissions from compost production are included under the subcategory 6.D other. All calculations are described in the NIR; however, more explanation and methodological information could be included along with referencing the sources of information. The reported recalculations in the original 2006 submission were carried out for CH_4 emissions from SWDL and CO_2, CH_4 and N_2O emissions from waste incineration.

Key categories

Solid waste disposal on land – CH_4

102. The share of CH_4 emissions from this category is the highest in the waste sector and amounted to 74.4 per cent of the total emissions in the base year. The contribution of SWDL is 32.0 per cent of the total national CH_4 emissions and 2.6 per cent of the total national emissions for the base year. Italy used tier 2 (first order decay model) for the estimation of CH_4 emissions from SWDL in line with the IPCC good practice guidance. The AD on municipal solid waste (MSW) generation were obtained from the national waste cadastre. The EFs are based on the national data of waste composition taking into account the speed of the degradable process for different type of MSW: rapid (food and sludge), moderate (waste from gardens and parks) and slow (paper, textiles, leather, wood and straw).

103. Following the recommendation of the previous (2005) review, the category was recalculated for the entire time series including the base year. Besides other changes, new information on sludge amounts disposed on landfills was included and the CH_4 density value was corrected to 0.68 kg/m3 instead of the previous value of 0.74 kg/m3 which had previously been used. All these recalculations led to an increase in the base year emissions by 8.14 Gg. The ERT considers the changes to be an improvement, however, it recommends that Italy clearly document recalculations and methodological choices made in its NIR of future submissions.

Wastewater handling – CH_4

104. The share of CH_4 from wastewater handling in the total emissions from the waste sector in the base year was 10.4 per cent. The estimates cover handling of industrial, domestic and commercial wastewater and sludge. Italy used the IPCC tier 1 methodology and default EFs, while national values were not available. The percentages of aerobic and anaerobic wastewater treatment are based on expert judgement and have not changed since the base year. National data were used in the calculations of

degradable carbon values for industrial plants. The ERT recommends that Italy give more methodological explanations on these values and their changes between years. The uncertainty of the estimates is still considered to be high (104 per cent). Given the importance of the source, the ERT recommends that Italy make further efforts to reduce the uncertainty of the estimates.

Wastewater handling – N_2O

105. N_2O emissions from wastewater handling were identified as a key category only in the tier 2 trend assessment of Italy and were not identified as a key category according to the secretariat's analysis. For estimating N_2O emissions from human sewage Italy uses a constant value of protein consumption for all years (1990–2004), which was obtained from the National Research Centre on Nutrition (1997) and accounted for 60 g protein/capita/day, which amounts to half of the FAO values reported for Italy (111–113 g protein/capita/day for the last few years). The ERT recommended that Italy revise N_2O emissions from human sewage based on updated protein consumption from the FAO data or fully documented national information. After the in-country review, following the ERT recommendations, Italy revised the emissions for this category and presented new estimations of N_2O emissions from human sewage for the base year and the complete time series, which resulted in an increase of emissions by 2.64 Gg of N_2O (819.10 Gg of CO_2 eq.) in the base year, with the revised estimate being 5.79 Gg of N_2O. Italy used the same protein consumption value as in the FAO statistics for Italy.

Non-key categories

Waste incineration – CO_2

106. CO_2 emissions from waste incineration with energy recovery are reported in the energy sector under category 1.A.4a commercial/institutional. The ERT encourages Italy to further investigate the correctness of reporting of these emissions under 1.A.4a or under 1.A.1a public electricity and heat production and to provide more information on this in its next NIR. CO_2 emissions from incineration of non-biogenic waste (without energy recovery) are reported in table 6.C. However, the level of aggregation of reporting at the level of table 6.C hides the type of waste considered in the estimate (namely municipal waste, industrial waste and waste oil, hospital waste and sewage sludge) and aggregates the used EFs. The ERT recommends that Italy report separately the waste flows in the CRF tables in its next submission to improve the transparency of reporting for this category.

C. Calculation of the assigned amount

107. The assigned amount pursuant to Article 3, paragraphs 7 and 8, is calculated in accordance with the annex to decision 13/CMP.1.

108. Italy's base year is 1990 and the Party has chosen 1990 as base year for HFCs, PFCs and SF_6. Italy's quantified emission reduction commitment is 92 per cent, as included in Annex B to the Kyoto Protocol. As Italy is part of the European Community, whose member states will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, Italy's quantified emission reduction commitment is 93.5 per cent. Italy's assigned amount is calculated based on the its Article 4 commitment.

109. Based on its base year emissions (519,464.323 Gg CO_2 eq.) and its Kyoto Protocol quantified emission reduction commitment (93.5 per cent), Italy originally calculated its assigned amount to be 2,428,495,710 tonnes CO_2 eq.

110. In response to inventory issues identified during the review, Italy submitted revised estimates of its base year inventory – 516,850.887 Gg CO_2 eq. – which resulted in a recalculation of the assigned amount. Based on the revised estimates, Italy calculates its assigned amount to be 2,416,277,898 tonnes CO_2 eq. The ERT agrees with this figure.

D. Calculation of the commitment period reserve

111. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1.

112. Based on its originally calculated assigned amount, which is 2,428,495,710 tonnes CO_2 eq., Italy calculates its commitment period reserve to be 2,185,646,139 tonnes CO_2 eq.

113. In response to inventory issues identified during the review, Italy submitted a revised estimate for its base year inventory of 516,850.887 Gg CO_2 eq., which resulted in a recalculation of the its assigned amount. Based on the revised calculation of the assigned amount, Italy calculates its commitment period reserve to be 2,174,650,108 tonnes CO_2 eq. The ERT agrees with this figure.

E. National registry

114. Italy has provided all information on the national registry system as required by the reporting guidelines under Article 7, paragraphs 1 and 2, of the Kyoto Protocol (decision 15/CMP.1) in its initial report. The information provided is transparent and in accordance with the requirements of these reporting guidelines. However, during the in-country review the ERT noted that the following two items have not yet been implemented:

(a) Operationality of the registry system (planned to be operational in September 2007);

(b) Recovery of registry services in the event of a disaster (planned to be operational in July 2007).

After the in-country review Italy informed the ERT that these items were implemented. The ERT recommends Italy to provide information on this in its next inventory report under the Kyoto Protocol.

115. During the in-country review, the ERT was provided with additional and updated information on the national registry of Italy, including further details on server configuration, the website structure and the operator manual, which helped to verify the previously reported data.

116. Table 5 summarises the information on the mandatory reporting elements on the national registry system, as stipulated by decision 15/CMP.1, which describes how its national registry performs functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1.

Table 5. Summary of information on the national registry system

Reporting element	Provided in the initial report	Comments
Registry administrator		
Name and contact information	Yes	Contact information is provided in the initial report, but not the name of the registry administrator
Cooperation with other Parties in a consolidated system		
Names of other Parties with which Italy cooperates, or clarification that no such cooperation exists.	Yes	Registry is currently linked to the other operational EU member states' national registries
Database structure and capacity of the national registry		
Description of the database structure	Yes	
Description of the capacity of the national registry	Yes	
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	Yes	Covered in the independent assessment report (IAR)a
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units	Yes	See below for details
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	Yes	See below for details
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	Yes	Covered in the IAR
An overview of how these measures are kept up to date	Yes	
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	Yes	Covered in the IAR
The Internet address of the interface to Italy's national registry	Yes	http://www.greta.sinanet.apat.it
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	Covered in the IAR
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	No	Test results covered in the IAR

[a] Pursuant to decision 16/CP.10, the administrator of the international transaction log (ITL), once registry systems become operational, is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the ITL with other registry systems. The results of this exercise will be included in an independent assessment report (IAR). They will also be included in the annual report to the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

117. During the in-country review, the registry system contained only EU ETS functions and was ready to be upgraded to version 3.0 of the GRETA software containing both required EU ETS and Kyoto features. Testing of the new version was planned to take place in June/July 2007. The upgrade to version 3.0 in a test environment and production phase were planned to take place in September 2007.

118. During the in-country review, the ERT was informed that the internal operational test of the registry for network connection was not yet complete. The initialization process was expected to be completed by July 2007 and the registry to be fully operational by September 2007. Information on the registry is publicly available through http://www.greta.sinanet.apat.it. The ERT encouraged Italy to complete the initialization testing early enough to allow the ERT to complete its review of the national registry. After the in-country review Italy notified the ERT that the initialisation test was completed on 21 November 2007.

119. The ERT was also informed of the procedures and security measures to minimize discrepancies, terminate transactions and correct problems, and minimize operator error. The GRETA registry system used by Italy, has been developed for the EU ETS. This scheme requires its member states' registries to be compliant with the Data Exchange Standards (DES) specified for the Kyoto Protocol. A 24-hour clean-up, transaction status enquiry, time synchronization, data logging requirements (including transaction log, reconciliation log, internal audit log and message archive) and the different identifier formats as specified in the DES have been implemented. Italy informed the ERT of its plans to undertake extensive tests on these functionalities with the international transaction log (ITL) test system once it becomes available. With regard to performing tests with the clean development mechanism registry (external transfer, for example) this can also be performed once the ITL test system becomes available. However, certain requirements still need to be developed, for example, handling temporary certified emission reductions (tCERs) and long-term certified emission reductions (lCERs).

120. The ERT acknowledged the effort made by Italy to put in place specific registry procedures and security measures. The servers are located in a physically secure data centre with 24/7/365 on-site guards and control system for access at the APAT data centre. A second system is located at an official data warehouse where it is maintained by the data centre personnel. All data centres are fitted with smoke detection and automatic fire suppression systems. During the in-country review, adequate measures to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster were planned, but still to be implemented. After the in-country review Italy informed the ERT that all these measures were implemented. Also, it was planned to house a complete second server system at an IT provider, guaranteeing maintenance and data safety. Negotiations with potential service providers were under way. Italy informed the ERT that the implementation of backup and recovery of registry services in the event of a disaster was planned for the end of June 2007. After the in-country review Italy informed the ERT that all these actions were implemented. The ERT recommends that Italy provide details on the recovery of registry services in its next inventory submission under the Kyoto Protocol.

121. However, the ERT gained the overall impression that Italy allocated few resources, including human resources, to the development, operation and maintenance of the registry. Human resources for technical and administrative support of the system were found to be limited (1 person each). Maintaining a high-quality staff for tasks like internal documentation, operator support, website administration and fast reaction to software problems requires additional resources. The ERT recommended increasing human resources by a minimum of two staff members for technical and administrative support plus one staff member for a help desk function. After the in-country review, Italy informed the ERT that it is aware of the need for additional staff and that actions are planned in this respect. Italy informed the ERT that APAT will continue acting as registry administrator on behalf of the Ministry for the Environment, Land and Sea in the first commitment period of the Kyoto Protocol. In this regard, the ministry, which is responsible for the management and functioning of the registry by Legislative Decree 216/2006, has requested APAT to provide a detailed evaluation of the necessary resources. The ERT recommends that Italy provide details on the action taken to solve this issue in its next inventory submission under the Kyoto Protocol.

122. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the independent assessment report that was forwarded to the ERT by the administrator of the ITL, pursuant to decision 16/CP.10, on 7 December 2007.

123. The ERT reiterated the main findings of this report, including that the registry has fulfilled all of its obligations regarding conformity with the DES. These obligations include having adequate transaction procedures; adequate security measures to prevent and resolve unauthorized manipulations; and adequate measures for data storage and registry recovery.

124. Based on the results of the in-country review and the technical assessment, as reported in the IAR, the ERT concluded that Italy's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding operational performance or public availability of information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

125. Table 6 shows Italy's choice of parameters for forest definition and its elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	10%	
Minimum land area	0.5 ha	
Minimum tree height	5 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3, paragraph 3, activities	**Election**	**Accounting period**
Afforestation and reforestation	Mandatory	Commitment period
Deforestation	Mandatory	Commitment period
Article 3, paragraph 4, activities		
Forest land management	Elected	Commitment period
Cropland management	Not elected	Not applicable
Grazing land management	Not elected	Not applicable
Revegetation	Not elected	Not applicable

126. The elected parameter values for the definition of forest are within the ranges prescribed in paragraph 1(a) of the annex to decision 16/CMP.1. Italy reports that deforestation data will be derived from administrative records, inventory data and mapping information. The ERT appreciates the effort of Italy to acquire periodically remote sensing data and to repeat a forest inventory (by 2013) and its plan to report this information in its next NIR. The ERT was unclear about the inclusion or exclusion, under forest, of farmlands, orchards, gardens and parks, and whether they satisfy the definition of forests. Clarification was provided by Italy after the in-country review, indicating that farmlands, gardens and parks are included under the settlements category, while orchards are to be considered under the cropland category. The ERT considers this to be adequate**.**

III. Conclusions and recommendations

A. Conclusions

127. The information provided by Italy in its initial report is complete and covers the elements required by paragraphs 5, 6, 7 and 8 of the annex to decision 13/CMP.1, section I of the annex to decision 15/CMP.1, and relevant decisions of the CMP. Additional information on all elements was provided to the ERT during the in-country review.

128. Italy's national system is generally prepared in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1) and reported in accordance with the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol (decision 15/CMP.1). At present, the national system can perform the general and

specific functions that are required by the guidelines for national systems. During the in-country review the ERT noted that some of the legal, institutional and procedural arrangements of the national system are not fully developed in line with Article 5.1 of the Kyoto Protocol and requested Italy to provide additional information. After the in-country review, Italy confirmed that legal, institutional and procedural arrangements are in the process of being further developed. The ERT noted that it is necessary to complete this process on time so that the existing capacity is sustained in the future. The ERT is satisfied with the efforts made by Italy to address all issues raised during the review and recommends that Italy report this information in its next submission under the Kyoto Protocol.

129. Italy has provided its GHG inventory data for the base year (1990) and the years 1991–2004, and has included all the tables required with data on all relevant gases and categories. Italy's inventory conforms to the UNFCCC reporting guidelines, the Revised 1996 IPCC guidelines and the IPCC good practice guidance. The inventory is of high quality and in a continuous process of improvement. However, during the in-country review the ERT identified a few categories where methods or EFs used were not fully in accordance with the IPCC good practice guidance and this might lead to overestimation of emissions in the base year or underestimation of emissions in the most recent years. The ERT recommended that Italy revise its estimates for these categories. The ERT also found specific areas where further improvements are needed. These improvements refer mainly to better documentation of decision-making in the NIR and the collection of AD in some areas (for example LULUCF). After the in-country review, Italy provided revised estimates for these categories for the complete time-series, and particularly for the base year and 2004 in accordance with the recommendations of the ERT and in line with the IPCC good practice guidance. The revised base year emissions amount to 516,850.887 Gg CO_2 eq. compared with 519,464.323 Gg CO_2 eq. submitted originally in the 2006 inventory submission. The ERT does not recommend the application of adjustments in any inventory category.

130. Italy responded to the identification of potential problems during the review by providing additional information and revising GHG emissions estimates. The ERT notes that Italy provided timely and thorough replies to the ERT questions concerning potential problems.

131. The assigned amount pursuant to Article 3, paragraphs 7 and 8, is calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the revised base year inventory estimates. Taking into account Italy's election of 1990 as the base year for HFCs, PFCs and SF_6, and its quantified emission reduction commitment under the European Community use of article 4 of the Kyoto Protocol, the ERT confirms that Italy's assigned amount is 2,416,277,898 tonnes CO_2 eq.

132. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1. The ERT confirms that Italy's commitment period reserve based on Italy's revised calculation of the assigned amount is 2,174,650,108 tonnes CO_2 eq.

133. Italy identified all the required information on parameters and elections for LULUCF under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in its initial report. Italy selected as parameters for forest definition 10 per cent of minimum tree cover, 0.5 ha of minimum land area and 5 metres as minimum tree height. These parameters are within the ranges established under decision 16/CMP.1. Forest land management is the only article 3, paragraph 4, activity elected by Italy. LULUCF activities will be accounted for the entire commitment period.

134. Italy provided information on its national registry as required by Article 7, paragraphs 1 and 2, of the Kyoto Protocol and decision 15/CMP.1. The ERT believes that human resources attached to the technical and administrative operation of the registry are restricted at present. After the in-country review, Italy informed the ERT that APAT will continue acting as registry administrator on behalf of the Ministry for the Environment, Land and Sea in the first commitment period of the Kyoto Protocol. In this regard, the ministry, which is responsible for the management and functioning of the registry by

Legislative Decree 216/2006, has requested APAT to provide a detailed evaluation of the resources needed.

135. During the in-country review, the registry was still not operational. After the in-country review, the initialization test was completed on 21 November 2007. Based on the results of the technical assessment, as reported in the independent assessment report, the ERT concluded that Italy's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1.

B. Recommendations

136. In the course of the review, the ERT formulated recommendations relating to the completeness and transparency of Italy's information presented in the initial report and in the 2006 GHG inventory submission. Most of the recommendations were implemented during the review process and the potential problems that could have led to overestimations of emissions in the base year have been resolved. The ERT notes that further steps should be taken so that the obligations under the Kyoto Protocol are fully implemented with a similar level of ambition and quality, as compared to the national GHG inventory. The remaining key recommendations[5] are that Italy should:

(a) Continue and finalize the process of further developing legal, institutional and procedural arrangements under the national system to ensure the sustainability of existing capacities and competence of technical staff;

(b) Finalize the process of formally designating APAT as the single national entity for the preparation of the inventory and formalizing the process for the official approval of the inventory;

(c) Increase resources allocated to the technical and administrative operation of the registry and ensure that the registry properly performs its functions;

(d) Ensure future reporting of supplementary information related to activities under article 3, paragraphs 3 and 4, of the Kyoto Protocol.

137. The key recommendations[6] relating to Italy's GHG inventory submission that the ERT believes should be considered in the course of future reviews are that Italy:

(a) Improve documentation in the NIR of decisions based on expert judgement;

(b) Improve transparency of the GHG inventory by including in the NIR more information on methodologies and underlying assumptions taken in the elaboration of emission estimates and on the rationale behind recalculations;

(c) Provide all CRF tables, including those relating to key category analysis and explanatory information on recalculations (tables 8(a) and 8(b));

(d) Provide the key category analysis for the base year;

(e) Implement source-specific QA/QC procedures;

(f) Improve collection of input data in some specific areas, for example, LULUCF.

C. Questions of implementation

138. No questions of implementation were identified by the ERT during the initial review.

[5] For a complete list of recommendations, the relevant sections of this report should be consulted.
[6] For a complete list of recommendations, the relevant sections of this report should be consulted.

Annex I

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at: <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>

IPCC. Good practice guidance for land use, land-use change and forestry, 2003. Available at: <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>

IPCC/OECD/IEA. Revised 1996 IPCC Guidelines for national greenhouse gas inventories, volumes 1–3, 1997. Available at: <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>

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UNFCCC secretariat. Synthesis and assessment report on the greenhouse gas inventories submitted in 2006. FCCC/WEB/SAI/2006. Available at: <http://unfccc.int/resource/docs/webdocs/sai/sa_2006.pdf>

UNFCCC secretariat. Italy: Report of the individual review of the greenhouse gas inventory submitted in the year 2005. FCCC/WEB/IRI/2005/ITA. Available at: <http://unfccc.int/resource/docs/2005/arr/ita.pdf>

UNFCCC secretariat. Italy: Independent assessment report of the national registry of Italy. Reg_IAR_ITA_2007_1. Will be available at <www.unfccc.int>

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Riccardo de Lauretis (APAT) and the members of the inventory team in APAT, including additional material on the methodology and assumptions used. Excel working files and access to the reference databases were also provided when needed to the ERT for all sectors.

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Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
Bo	methane producing capacity
CH_4	methane
CMP	Conference of the Parties serving as the Meeting of the Parties
CO_2	carbon dioxide
CO_2 eq.	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
EC	European Community
EIT	economy in transition
EF	emission factor
ERT	expert review team
ETS	emissions trading scheme
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10^9 joule)
GWP	global warming potential
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
kgoe	kilograms of oil equivalent
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MCF	methane conversion factor
MEW	Ministry for Environment and Water
Mg	megagram (1 Mg = 1 tonne)
$MgCO_3$	
Mt	million tonnes
Mtoe	millions of tonnes of oil equivalent
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
SO_2	sulphur dioxide
SWDS	solid waste disposal site
Tg	teragram (1 Tg = 1 million tonnes)
TJ	terajoule (1 TJ = 10^{12} joule
UNFCCC	United Nations Framework Convention on Climate Change

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