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**Report of the individual review of the annual submission of Italy
submitted in 2009***

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Italy, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 7 to 12 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Michael Strogies (Germany) and Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Simon Wear (New Zealand) and Mr. Glen Whitehead (Australia); industrial processes – Ms. Debra Ottinger (United States of America) and Ms. Birna Hallsdottir (Iceland); agriculture – Mr. Sergio González (Chile) and Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Peter Stephens (New Zealand) and Mr. Héctor Ginzo (Argentina); and waste – Mr. Hiroyuki Ueda (Japan) and Ms. Juliana Boateng (Ghana). Mr. Strogies and Mr. Gonzalez were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (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, into this final version of the report.

B. Emission profiles and trends

3. In 2007, the main GHG in Italy was carbon dioxide (CO₂), accounting for 86.0 per cent of total GHG emissions¹ expressed in CO₂ eq, followed by methane (CH₄) (6.9 per cent) and nitrous oxide (N₂O) (5.8 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.3 per cent of the overall GHG emissions in the country. The energy sector accounted for 83.0 per cent of the total GHG emissions, followed by agriculture (6.7 per cent), industrial processes (6.6 per cent), waste (3.3 per cent) and solvent and other product use (0.4 per cent). Total GHG emissions amounted to 552,771.35 Gg CO₂ eq and increased by 7.1 per cent between the base year² and 2007.

4. Tables 1 and 2 show total GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector.

¹ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

² “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1990–2007^a

Greenhouse gas	Gg CO ₂ eq							Change base year–2007 (%)
	Base year ^b	1990	1995	2000	2005	2006	2007	
CO ₂	434 687.67	434 687.67	445 400.65	462 715.45	490 056.41	485 753.66	475 302.06	9.3
CH ₄	41 738.88	41 738.88	44 157.53	44 196.69	39 644.52	38 044.18	38 217.46	–8.4
N ₂ O	37 400.24	37 400.24	38 364.14	39 772.27	37 898.99	32 540.21	31 835.81	–14.9
HFCs	351.00	351.00	671.29	1 985.67	5 267.03	5 956.20	6 700.69	1 809.0
PFCs	1 807.65	1 807.65	490.80	345.85	352.62	282.30	287.78	–84.1
SF ₆	332.92	332.92	601.45	493.43	465.39	405.87	427.55	28.4

^a Total greenhouse gas emissions includes emissions from Annex A sources only (excludes emissions/removals from the LULUCF sector).

^b “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO ₂ eq							Change base year–2007 (%)
	Base year ^a	1990	1995	2000	2005	2006	2007	
Energy	418 945.37	418 945.37	431 961.27	450 722.44	474 505.53	469 585.98	458 672.79	9.5
Industrial processes	36 466.66	36 466.66	34 530.35	34 903.34	40 366.88	35 915.85	36 295.95	–0.5
Solvent and other product use	2 394.46	2 394.46	2 179.77	2 284.53	2 139.11	2 146.55	2 132.81	–10.9
Agriculture	40 576.25	40 576.25	40 348.92	39 939.85	37 241.73	36 627.42	37 210.50	–8.3
LULUCF	NA	–67 493.30	–85 589.62	–79 230.21	–95 336.38	–89 804.03	–70 909.82	NA
Waste	17 935.63	17 935.63	20 665.57	21 659.21	19 431.70	18 706.62	18 459.31	2.9
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	448 825.07	444 096.25	470 279.15	478 348.57	473 178.39	481 861.53	NA
Total (without LULUCF)	516 318.37	516 318.37	529 685.87	549 509.36	573 684.95	562 982.42	552 771.35	7.1

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable.

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 15 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). Italy also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including accounting of Kyoto Protocol units, and information on changes in the national system and in the national registry. The standard electronic format (SEF) tables were also submitted on 15 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. Italy indicated that the 2009 submission was also its voluntary submission under the Kyoto Protocol.
6. Italy submitted information on 22 September 2009 in response to questions on the completeness of its annual inventory submission raised by the expert review team (ERT). Where necessary, the ERT also used the previous years' submissions during the review.
7. In addition, the ERT used the Standard Independent Assessment Report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and comparison report) and on the national registry.³
8. During the review, Italy provided the ERT with additional information. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

9. The inventory covers all sectors and most source and sink categories and GHGs for the period 1990–2007, and is complete in terms of geographical coverage. The NIR in general follows the outline set out in the “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 all CRF tables have been reported for all years, except table 7 (key category analysis), which has been reported only for 1990 and 2004–2007. The ERT encourages Italy to explore the possibility of reporting CRF table 7 for all years of the time series.
10. In response to a question raised by the ERT during the review, Italy indicated that it would address, in its next annual submission, the issues raised with regard to the completeness of its inventory, including the estimation of emissions from biomass consumption in the pulp, paper and print industry. In addition the Party indicated that while some other Parties estimated N₂O emissions from other use of N₂O (3.D.4), no method to estimate these emissions is available in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) or in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). However, the Party further indicated to the ERT that it would explore the possibility of estimating N₂O emissions from explosives. The ERT recommends that Italy improve the completeness of its inventory by the next annual submission, especially with regard to reporting on those categories in which emissions are known to occur in the country and for which methodologies to estimate emissions are available in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance.

³ The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paragraphs 5(a), 6(c) and 6(k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

The ERT also recommends that the Party, when reporting data on emissions for the first time for a given category, ensure that these data are provided for the entire inventory time series, and that the rationale for the choice of methods, emission factors (EFs) and other parameters is clearly explained in the NIR.

D. Main findings

11. In its 2009 annual submission, Italy's inventory continues generally to have been prepared and reported in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). However, the ERT found that Italy could improve the transparency of its inventory submission, by providing information in the NIR to explain and justify its use of EFs (e.g. for ferroalloys) and other parameters (e.g. oxidation factors for liquid fuels used in the energy sector (see para. 56 below)) from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). The ERT also found statements in the NIR clarifying that the Party had used data obtained from the European Union emissions trading scheme (EU ETS) to estimate emissions from a number of categories in the industrial processes sector and to improve EFs and verify activity data (AD) in the energy sector; however, the ERT concluded that the Party has not provided sufficient information in its NIR, particularly for the energy sector, to allow the ERT to verify:

- (a) Whether these data have been prepared and incorporated into the inventory submission in line with the IPCC good practice guidance;
- (b) Whether these data have been subjected to quality assessment (QA) and/or verification and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance;
- (c) How time-series consistency has been ensured when using these data in the inventory, and the effect of the use of these data on the trend in emissions.

12. Recalculations performed by the Party over the time series were found to be in line with the IPCC good practice guidance, and have been reported, including information on the underlying rationale for these recalculations, in accordance with the UNFCCC reporting guidelines.

13. The 2009 inventory submission is generally of a good quality and shows improvement, in comparison with the previous annual submission, as result of new information being included in the inventory (e.g. on the agriculture sector (see para. 70 below)) and recommendations of previous ERTs being addressed (see para. 38 below).

14. Italy has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with Part I of the annex to decision 15/CMP.1. The Party did not submit on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, and information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

15. Italy has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the SEF tables as required by decision 14/CMP.1.

16. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. However, the ERT identified a potential problem that will need to be addressed by the Party in the preparation for its 2010 annual submission. This potential problem relates to the cut in the funding of the national system and the effect of this cut on the capacity of the Party's national

registry for forest carbon sinks to identify areas of land and land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1, and to provide information, including estimates of emissions/removals, on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (see paras. 82, 83 and 84 below).

17. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) decisions.

18. The ERT encourages Italy to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.⁴

19. In the course of the review, the ERT formulated a number of recommendations relating to the transparency (see paras. 36, 43, 79, 87 and 92 below) and completeness (see paras. 9 and 10 above) of Italy's annual submission.

E. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

1. Overview

20. The ERT concluded that the national system and institutional arrangements continued to perform their required functions.

21. The NIR and specifically the document "National Greenhouse Gas Inventory System in Italy 2008" referenced therein described the national system and institutional arrangements for the preparation of the inventory. On the basis of legislation passed in March 2008, the Institute for Environmental Protection and Research (ISPRA), formerly known as the Agency for Environmental Protection and Technical Services (APAT), is the single national entity with overall responsibility for Italy's national inventory, in respect of the planning, preparation and management of the annual submission. The responsibilities of ISPRA include: collection and processing of AD; selection of appropriate EFs and methodologies; reporting and quality management activities; management and implementation of the QA/QC plan; and archiving of the inventory. ISPRA is responsible for establishing the annual plan for the national system, which is forwarded to the Italian Ministry for the Environment, Land and Sea, which is responsible for officially approving the annual submission. ISPRA is also responsible for the maintenance of the national registry and the Party's newly established national registry for forest carbon sinks (established in April 2008) that was established for the reporting of information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. Other agencies involved in the planning and preparation of the inventory include the National Statistical System (Sistan – coordinated by the National Institute of Statistics (Istat)), Ministry of Economic Development (energy balance), Ministry of Transportation, Italian Civil Aviation Authority, sectoral industrial associations and ISPRA (national waste cadastre).

22. The NIR states that, apart from the change of the name of the institution responsible for the inventory from APAT to ISPRA, there has been no change in the national system since the Party's previous annual submission.

⁴ <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

2. Inventory planning

23. The ERT concluded that Italy's inventory planning activities were in line with the guidelines for national systems (decision 19/CMP.1). The Party has elaborated a QA/QC plan, which allocates the roles and responsibilities within the national system and is linked to its quality management system. The QA/QC plan is updated annually as priorities for the improvement of the inventory submission are established and it consolidates the implemented improvements arising from internal and external reviews. The prioritization of inventory improvements focuses mainly on the emission sources and categories with high emission levels and uncertainties.

24. Italy's national system and its institutional, procedural and legal arrangements for inventory preparation were found by the ERT to be very effective, reliable and capable of delivering the annual submission in a timely manner.

25. However, the ERT noted from Italy's NIR that cuts had been made to the funding for important projects, such as the Party's 2012 national forest inventory and other related projects to improve the quality and availability of AD and parameters for estimating emissions by sources and removals by sinks from LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT strongly recommends that Italy ensure, by whatever available means, that its national system has the capacity and required resources to plan, prepare and manage an inventory for LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (hereinafter referred to as the KP-LULUCF inventory), noting that this reporting is mandatory under Article 7, paragraph 1, of the Kyoto Protocol, commencing with the annual submission due on 15 April 2010.

3. Inventory preparation

Key categories

26. Italy prepared and has reported a tier 1 key category analysis, both level and trend assessment, as part of its 2009 submission. The Party performed this key category analysis, which was in accordance with the IPCC good practice guidance for LULUCF, both excluding and including the LULUCF sector. Italy also performed a tier 2 key category analysis. The tier 1 key category analysis performed by the Party and that performed by the secretariat⁵ produced similar results. For the Party's 2009 annual submission, in comparison with the previous annual submission, land converted to grassland – CO₂ and wastewater handling – CH₄ were newly identified as key categories, while road transportation – N₂O was no longer identified as a key category.

27. Detailed information on how the Party uses its key category analysis to prioritize improvements to its inventory submission has not been provided in the NIR. The ERT reiterates the recommendation of the previous ERT that Italy include this information in its NIR.

Uncertainties

28. Italy prepared and has reported a tier 1 uncertainty analysis in accordance with the IPCC good practice guidance. The ERT noted that the Party had also performed a tier 2 uncertainty analysis for the CO₂ emissions from road transportation and N₂O emissions from agricultural soils. The results of these analyses and a comparison of the tier 1 and tier 2 approaches have been included in the NIR. The ERT

⁵ The secretariat identified, for each Party, the 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 LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. 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.

also noted that the results of the tier 1 uncertainty analysis reported in the Party's 2009 annual submission were similar to those reported in its previous annual submission. Italy's uncertainty analysis provided an overall uncertainty assessment for its 2009 inventory submission (weighted global warming potential emissions, without LULUCF) of 3.3 per cent, and a trend uncertainty of 2.6 per cent for the period 1990–2007. The ERT further noted that when LULUCF was included in the analysis the overall inventory uncertainty increased to 6.4 per cent and the trend uncertainty to 5.3 per cent.

29. The Party has extended the description in the NIR of its uncertainty analysis in response to a recommendation made by the previous ERT that it compare the uncertainty analysis reported in its latest annual submission with that in the previous annual submission. The ERT encourages Italy to explore the possibility of increasing the coverage of categories of its tier 2 uncertainty analysis and to report thereon in its next annual submission.

30. The Party uses the uncertainty analysis to prioritize improvements to its inventory, especially with regard to those categories for which high uncertainties in AD, EFs or other parameters are observed (e.g. categories in the agriculture and LULUCF sectors and for fluorinated gases). However, the ERT recommends that Italy include a more detailed description of its use of the uncertainty analysis as a driver for prioritizing inventory improvements, in the relevant chapter of its NIR.

Recalculations and time-series consistency

31. Recalculations have been performed and reported in accordance with the IPCC good practice guidance and the UNFCCC reporting guidelines. The ERT found that recalculations performed by the Party of the time series 1990–2006 have been undertaken to take into account: revised CO₂ EFs in the energy sector for natural gas, coal and fuel oil; new information from studies for use in the estimation of emissions from aviation; a switch in software (Computer Program to calculate Emissions from Road Transport (COPERT) IV model used to estimate emissions from transport) (see para. 54 below); verified data from the EU ETS on cement and lime production; a revised CO₂ EF for ferroalloys production; new data on manure management, rice production and agricultural soils; and revised data on wastewater handling and waste incineration.

32. The major changes, and the magnitude of the impact, include decreases in the estimates of total GHG emissions by 0.11 and 0.15 per cent for the base year (1990) and 2006, respectively. In addition, the ERT noted some specific impacts of the recalculations performed by the Party, including: for the base year, decreases in N₂O emission estimates from the energy sector by 11.6 per cent and for all GHGs from the LULUCF sector by 14.7 per cent; and, for 2006, decreases in N₂O emission estimates from the energy sector by 31.7 per cent, CH₄ emissions from the energy sector by 2.0 per cent and CO₂ emissions from industrial processes sector by 3.3 per cent, and increases in CH₄ emission estimates from the LULUCF sector by 11.5 per cent and by 141.3 per cent for N₂O emissions from the LULUCF sector. The rationale for these recalculations has been well documented in the NIR and in CRF table 8(b). The recalculations resulted in improving the time-series consistency of the Party's emission estimates.

Verification and quality assurance/quality control approaches

33. In line with the UNFCCC reporting guidelines, the Party has included in its 2009 annual submission information on its QA/QC procedures. The Party performs sector-specific QA/QC procedures across all sectors of the inventory – these procedures are effective in identifying errors and improving the quality of the inventory and are implemented in accordance with the IPCC good practice guidance.

34. Italy has a QA/QC manual and also elaborates a QA/QC plan on an annual basis, which is published on the internet, including all relevant underlying documentation.

35. The ERT concluded that the Party's verification of its inventory is based, among other activities, on comparisons with plant-specific data and information obtained from the European Union directive on the limitation of emissions of certain pollutants into the air from large combustion plants, the European Pollutant Release and Transfer Register and EU ETS. EU ETS data are used to compare and update EFs used in the industrial processes sector. The ERT recommends that Italy explore the possibility of extending its use of EU ETS data for verification purposes to the energy sector.

Transparency

36. The Party's 2009 annual submission is in general transparent. The ERT noted improvement, in comparison with Italy's previous inventory submission, in the transparency of the information on emission trends provided in both the general and sector-specific sections of the NIR, as recommended in the previous review report. However, the ERT also identified areas for further improvement with regard to the transparency of the inventory, including the improvement of the presentation of some information tables in the NIR that are currently very condensed and difficult to read (e.g. table 1.7 Sources and sinks not estimated in the 2007 inventory, table 1.8 Sources and sinks reported elsewhere in the 2007 inventory, table 9.1 Explanations of the main recalculations in the 2009 submission, table 9.2 Comparison between the 2008 and 2009 submitted time series by gas and sector, and table A1.3 Results of the uncertainty analysis excluding LULUCF (tier 1)). The ERT recommends that Italy explore the possibility of improving its presentation of data and information in these tables for its next annual submission.

4. Inventory management

37. Italy has a centralized system for the archiving of disaggregated AD and EFs, and documentation on how these and other data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, documentation on annual key categories and key category identification and planned inventory improvements, all referenced material, emission estimates and calculation sheets, as well as documentation on scientific papers and the basic data needed for the compilation of the inventory. This archiving system was established and is maintained by ISPRA.

F. Follow-up to previous reviews

38. The ERT noted improvements in Italy's annual submission thanks to its implementation of recommendations made in the previous review report. The national QA/QC plan contains information in tabular format on these implemented recommendations, differentiated as either general or source/sink-related recommendations. With regard to the general recommendations made in the previous review report, the ERT found that the following improvements had been made by the Party: the improvement of its key category analysis (the inclusion of CRF tables for 1990 and also the reporting of CRF table 7); the inclusion of a description of its tier 2 uncertainty analysis in relation to extending the coverage of this approach; and the extension of the description of its QA/QC procedures, including information on the principles for the prioritization of future inventory improvements. With regard to the source/sink-related recommendations made in the previous review report, the ERT found that improvements had been made by the Party: in the energy sector (reference approach, methodological change in the estimation of emissions from road transportation to the COPERT IV model, changes to the allocation of emissions from waste incineration and of aviation-related emissions, and improvement of the description of feedstock); in the industrial processes sector (with regard to the categories ammonia production, adipic acid production and iron and steel production, and the transparency of the inventory for this sector); and in the agriculture sector (addition of an annex 7 to its 2009 NIR). However, the ERT also found that a number of the source/sink-related recommendations made in the previous review report had not been

addressed by the Party in its 2009 annual submission, and these are discussed in the relevant sector chapters of this report (see paras. 53 and 86).

G. Areas for further improvement

1. Identified by the Party

39. The 2009 annual submission provides information on areas for improvement identified by the Party, including:

- (a) The improvement of funding in support of a basic independent review of the inventory submission;
- (b) The making of progress with regard to the collection of information and data, and its subsequent assessment, in support of the Party's reporting of supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, related to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;
- (c) The improvement of the transparency of the NIR, especially with regard to the chapter on the energy sector;
- (d) The finalization of the database for storing plant-specific information collected for the energy and industrial processes sectors within the framework of different government directives (large combustion plants, European Pollutant Emissions Register/European Pollutant Release and Transfer Register, and emissions trading);
- (e) The completion of studies on best-available technologies used in the agriculture sector and on the availability of information on waste composition and other parameters, with a view to revising the AD, EFs and other parameters used;
- (f) The improvement of information on biomass burning and forest fires;
- (g) The improvement of its capacity to compare its local and national inventories;
- (h) The independent analysis of the collection of statistical data in order to improve the coverage of the tier 2 uncertainty analysis.

2. Identified by the expert review team

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

- (a) The improvement of the completeness of the inventory, specifically with regard to the reporting on all activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, for all carbon pools and GHGs (see paras. 82, 83 and 84 below);
- (b) The provision of information in the NIR on the use of EU ETS data, as outlined in paragraph 11 above;
- (c) The improvement of transparency, as detailed in paragraph 36 above;
- (d) The improved documentation of the uncertainty analysis, at least by improving the readability of the underlying information (see para. 36 above).

41. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

42. The energy sector is the main sector in the GHG inventory of Italy. In 2007, emissions from the energy sector amounted to 458,672.79 CO₂ eq, or 83.0 per cent of total GHG emissions. Since the base year, emissions have increased by 9.5 per cent. The key drivers for the rise in emissions are the increases in emissions from road transportation and from public electricity and heat production. Within the sector, 34.6 per cent of the emissions were from energy industries, followed by 28.2 per cent from transport, 17.9 per cent from other sectors, 17.6 per cent from manufacturing industries and construction, and 0.2 per cent from other (energy (1.A.5)). The remaining 1.6 per cent were fugitive emissions.

43. With regard to the energy sector, Italy's inventory is generally transparent and complete and has in general been prepared in accordance with the IPCC good practice guidance and the UNFCCC reporting guidelines. With respect to the UNFCCC reporting guidelines, the ERT identified areas for improvement, including that Italy enhance the discussion in the NIR on emission trends in the energy sector by referring to underlying or associated AD (e.g. in discussing the trends in the emissions from road transportation, vehicle numbers, changes in population, gross domestic product and heating or cooling days could be referred to). This additional information would help to validate the data on fuel consumption and aid understanding of the underlying emission trends that contribute to the overall emission trend in the energy sector.

44. Italy has addressed most of the recommendations made in the previous review report with regard to the energy sector. The implementation of these recommendations significantly improved the transparency of the Party's inventory for the energy sector (e.g. the inclusion of more information on the allocation of emissions from waste incineration to the energy sector, on the use of landfill gas and on the use of oxidation factors for the fraction of carbon oxidized during combustion from the 2006 IPCC Guidelines).

45. The recalculations performed by the Party of the estimates in the energy sector have been undertaken and reported in line with the IPCC good practice guidance. The ERT noted that the most significant recalculation in this sector was performed on the estimates of CH₄ and N₂O emissions from road transportation. The impact of this recalculation resulted in a decrease of 15.8 and 62.1 per cent for CH₄ and N₂O, respectively, for the 2006 inventory, and an increase of 15.9 per cent and a decrease of 35.4 per cent, respectively.

46. The ERT noted that Italy, in response to a recommendation of the previous ERT, has provided more detailed information on category-specific QA/QC activities used to improve the quality of the inventory for the energy sector. Italy's QC system includes routine checks for errors or omissions, and the ERT noted from the NIR (appendices 2, 3 and 6) that the Party verifies some energy data. The ERT recommends that Italy document more explicitly category-specific QA/QC procedures for non-mobile energy categories, consistent with the UNFCCC reporting guidelines.

47. In response to questions raised by the ERT during the review, the Party explained that EU ETS data are used to improve EFs and verify AD for the energy sector. The ERT recommends that this information be included in the Party's next annual submission, along with the information referred to in paragraph 11 (b) above.

48. The ERT encourages the Party to include in its NIR planned improvements specific to all categories in the energy sector, including non-mobile categories. If there are no planned improvements then this should also be stated.

B. Reference and sectoral approaches

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

49. For 2007 (as reported in the 2009 annual submission), there are differences between the estimates of energy consumption and of CO₂ emissions calculated using the reference and sectoral approaches of 0.2 per cent and –1.5 per cent, respectively. These differences are small and indicate a good reconciliation at an aggregated level, which is an improvement in comparison with the 2008 annual submission.

50. The ERT noted many discrepancies in the energy data reported in Italy's CRF tables compared with the corresponding data reported to the International Energy Agency (IEA), including the data on bunker fuels. The ERT found that the Party had undertaken improvements to the methodology used to estimate emissions from international and domestic navigation and aviation, but noted that, owing to the timing of the reporting of the data to the IEA, these improvements had no effect on the IEA data.

2. International bunker fuels

51. The present ERT noted that Italy had followed the recommendation of the previous ERT that it revise the methodology used to derive data on domestic and international fuel consumption, and also noted that the Party has reported the resultant recalculated time series for the aviation and navigation categories. Previously the split between domestic and international fuel consumption had been derived from data for 1999 which was held constant over the time series; whereas, for its 2009 inventory submission, the Party used data on the movements of aircraft and ships, technology, and fleet composition for the whole time series. The ERT commends the Party in improving the methodology used to derive data on domestic and international fuel consumption.

3. Feedstocks and non-energy use of fuels

52. The ERT noted from CRF table 1.A(d) that a percentage value (100 per cent) had been reported by the Party for the fraction of carbon stored, whereas this should be a fraction value (1.0). Also, the carbon EF should be expressed in t C/TJ, whereas Italy has reported its values in kt C/TJ. In addition, the ERT concluded that the fraction of carbon stored reported by Italy for naphta was high when compared to other Parties. The ERT recommends that the Party, in its next annual submission, provide an explanation as to why this value is higher than the values of most other reporting Parties and describe how the fraction of carbon stored is estimated.

C. Key categories

1. Stationary combustion: solid fuels – CO₂

53. Public electricity and heat production has a particularly low IEF for solid fuels for most years of the time series, especially for 2000. The calculated IEF for year 2000 is 91.45 t CO₂/TJ, which is well below the lowest value in the IPCC default range of 94.60–106.70 t CO₂/TJ. Italy has explained in its NIR that it has little indigenous coal production and that it relies heavily on imported coal, the source of which changes year on year. In addition, the Party explained, in annex 6 to its NIR, the problems it had with estimating the carbon content of the coal, and with linking statistical data on coal to the moisture and ash content of the coal. Furthermore, the ERT noted some possible transcription errors in the average carbon EFs reported by the Party in table A6.4 of its NIR, when compared with the EFs calculated by the ERT: for example, for 2006, the ERT calculated an average EF for coal of 95.98 t CO₂/TJ, whereas the average EF reported by the Party was 95.08 t CO₂/TJ. The ERT recommends that Italy implement its planned improvements to the statistical data on coal and its estimation of the moisture content of the coal. The ERT also recommends that Italy explore the

possibility of improving the transparency of the underlying data for this category by reporting its coal imports by source. In addition, the ERT reiterates the recommendation made in the previous review report that Italy implement improved QC procedures in order to reduce transcription errors in the data for this category.

2. Road transportation: liquid fuels – CO₂

54. Italy, following the recommendation of the previous ERT and as set out in the identified planned improvements in its 2008 NIR, has reported, in its 2009 annual submission, that it has upgraded from the COPERT III to the COPERT IV model as the basis for estimating emissions from road transportation. This improvement has been well documented in the NIR and resulted in improving the corresponding emission estimates, with recalculations reported for the period 1990–2006. These recalculations reduced the estimates of total GHG emissions from road transportation by 0.7 per cent and 2.1 per cent for 1990 and 2006, respectively.

3. Navigation: liquid fuels – CO₂

55. Italy, following the recommendation of the previous ERT and as set out in the identified planned improvements in its 2008 NIR, has reported, in its 2009 annual submission, a revised methodology for the derivation of domestic and international fuel consumption for navigation. This revised methodology has been well documented in the NIR and is in line with the IPCC good practice guidance. The Party has reported, in its NIR, a 14.7 per cent reduction in the estimate of total GHG emissions from this category for 2006. The ERT recommends that Italy improve the transparency of its recalculations for this category by providing, in future submissions, information on the impact of each recalculation (i.e. separate the effects of the recalculations on each mode of transport) for all GHGs, and information on how time-series consistency is ensured. The improvements to this category have otherwise been transparently documented in the NIR.

D. Non-key categories

1. Civil aviation: liquid fuels – CO₂

56. Italy used a carbon oxidation factor equal to one for jet kerosene and aviation gasoline, taken from the 2006 IPCC Guidelines. The ERT noted that the oxidation factor used in the sectoral approach was inconsistent with the corresponding oxidation factor used in the reference approach (0.99) for the above-mentioned fuels. The ERT recommends that the Party, in its next annual submission, clearly document its justification for using an oxidation factor from the 2006 IPCC Guidelines, and also provide an explanation of the difference between the oxidation factors used in the sectoral and reference approaches. The ERT also recommends that Italy explore the possibility of implementing category-specific QA/QC procedures that could identify such discrepancies in the future.

57. Italy, following the recommendation of the previous ERT and as set out in the identified planned improvements in its 2008 NIR, has reported, in its 2009 annual submission, a revised methodology for the derivation of domestic and international fuel consumption for civil aviation. This revised methodology has been well documented in the NIR and is in line with the IPCC good practice guidance. The resultant recalculations led to a 1.7 per cent decrease in the estimated total GHG emissions from this category in 2006. With regard to improving the transparency of these recalculations, the ERT reiterates the recommendation made in paragraph 55 above. The improvements to this category have otherwise been transparently documented in the Party's NIR.

2. Other sectors: other fuels – CO₂

58. The previous ERT noted that Italy had reported CO₂ emissions from waste incineration with energy recovery under this category, which is in line with the IPCC good practice guidance, and it encouraged Italy to improve the transparency of its reporting for this category by providing a more detailed description of the methods and procedures applied to estimate CO₂ emissions from waste incineration. The present ERT notes that Italy has provided thorough details on the composition of the waste incinerated in the country in the chapter on the waste sector in its NIR, as well as a cross reference to this information in the chapter on the energy sector, and commends Italy for following this recommendation.

III. Industrial processes and solvent and other product use

A. Sector overview

59. In 2007, emissions from the industrial processes sector amounted to 36,295.95 Gg CO₂ eq, or 6.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 2,132.81 Gg CO₂ eq, or 0.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 0.5 per cent in the industrial processes sector, and decreased by 10.9 per cent in the solvent and other product use sector. In the industrial processes sector, there have been opposing trends in emissions, which have cancelled each other out. The key drivers for the overall sectoral emission trend since the base year include the significant increase in emissions from consumption of halocarbons and SF₆ (by 3,246.7 per cent), and the decreases in emissions from chemical industry (by 64.1 per cent), metal industry (by 60.0 per cent) and production of halocarbons and SF₆ (by 97.0 per cent). Within the industrial processes sector, 65.2 per cent of the emissions were from mineral products, followed by 19.7 per cent from consumption of halocarbons and SF₆, 8.8 per cent from chemical industry and 6.2 per cent from metal industry. Production of halocarbons and SF₆ accounted for 0.1 per cent of the sectoral emissions.

60. The reporting on the industrial processes sector in Italy's inventory is generally complete. Estimation approaches, information on data availability and relevant documentation have been in general transparently presented in the NIR. However, Italy could further enhance transparency by providing additional information regarding: the nature of the emissions from the silicium production that occurred until 2001; and the data and methods used to estimate emissions from the pulp and paper industry, some subsectors of the mineral industry, adipic acid production, aluminium production, and consumption of halocarbons and SF₆ (see paras. 64, 65 and 66 below). The ERT recommends that Italy clarify in the NIR that production of HFC-227ea only occurred in 1999. In addition, the ERT recommends that Italy complete its reporting in the CRF tables for this sector by updating the notes under table 2(II).F to clarify that emissions from disposal of equipment have been included with emissions during the products' life (see para. 65 below).

61. The Party used a tier 1 approach to estimate uncertainties for the industrial processes sector. The ERT found that Italy had applied general QA/QC procedures in compiling the inventory for the industrial processes sector, and that the Party had used EU ETS data and data reported under EPER/E-PRTR, for some parts of its inventory. In some instances this led to a lower implied emission factor (IEF) (e.g. for cement and lime production (see para. 62 below)). The ERT noted that some of these data were verified (e.g. compared with data provided by production companies).

B. Key categories

1. Cement production – CO₂

62. CO₂ emissions from cement production were estimated using a tier 2 method and AD on clinker production provided by Istat. EFs were estimated on the basis of information provided by the Italian Cement Association and by the cement-producing facilities, and were found to be in line with the IPCC good practice guidance. For the years 1990 to 2003, the resulting EF was 0.54 t CO₂/t clinker. Recalculations were performed for the years 2004–2006, on account of the provision of information by the cement-producing facilities within the framework of E-PRTR and EU ETS, resulting in lower IEFs. The ERT noted variations in the CO₂ emission trend throughout the time series. In response to a question raised by the ERT on this matter, Italy explained that this variation in emissions was attributable to the variation in the average calcium oxide content of the clinker produced, which takes into account the contribution of carbonates and additives. The ERT noted that Italy had reported how data from industry were verified, but that the Party had not provided information in the NIR on the outcome of this verification. The ERT recommends that Italy provide improved information on the verification of these data in its next annual submission.

2. Adipic acid production – N₂O

63. Italy has improved the transparency of the information in its NIR on the method and data used to estimate N₂O emissions from adipic acid production, particularly with regard to the use (operating time) of the abatement technology. The ERT recommends that Italy further improve transparency by including more information in its NIR on the efficiency of this abatement technology and an explanation of how this information is used, along with information on the use of the abatement technology and the default N₂O generation factor used to derive the EF for this category. The ERT noted that Italy provided much of this information during the review in response to questions of the ERT; however, the ERT calculated the post-control emission rates using this information and it was found to be inconsistent with the value reported by Italy. This issue remains unresolved.

3. Aluminium production – PFCs

64. For this category, emissions were estimated using a variant of the tier 1 methodology for 1990–1999 and a tier 2 methodology for 2000–2006. The default EFs used in the tier 1 approach were from the 2003 Aluminium Sector Greenhouse Gas Protocol⁶ rather than from the IPCC good practice guidance. For the smelter technology (Side Work Prebake) that was widely used in Italy in 1990, the ERT found that the use of these default CF₄ and C₂F₆ EFs leads to a lower emission estimate than the use of comparable default EFs in the IPCC good practice guidance; thus, Italy's estimate of 1990 emissions is probably conservative even though the time series is not consistent.⁷ Italy does not discuss the conservative nature of its 1990 default EFs in the NIR; however, Italy states that its time series is conservative because it shows a smaller decrease in emissions than a corresponding time series generated using only the EFs from the "Aluminium Sector Greenhouse Gas Protocol". This argument is not

⁶ The Aluminium Sector Greenhouse Gas Protocol (Addendum to the WBCSD/WRI Greenhouse Gas Protocol), International Aluminium Institute (IAI), May 2003. This document was superseded by an update published in October 2006 which does not contain declining EFs or EFs for Point Feed Prebake technology.

⁷ The one caveat is that the 1990 CF₄ EFs for Centre Work Prebake and Horizontal Stud Soderberg technology (HSS) in the Aluminium Sector Greenhouse Gas Protocol are higher than those in the IPCC good practice guidance, but the importance (if any) of Centre Work Prebaked and HSS in Italy in 1990 is not discussed in the NIR.

persuasive, as the time series used in the comparison is not conservative.⁸ The ERT found that Italy did not provide in the NIR rationale for the use of two different approaches; however, in response to questions raised by the ERT during the review, Italy referred the ERT to a finding contained in document FCCC/ARR/2006/ITA which stated that a recalculation was not possible due to plant closures and upgrading of technology. The ERT recommends that Italy explore whether historical operating data (anode effect minutes and/or overvoltages) are available to extend the use of the tier 2 methodology to estimate emissions for the whole time series for smelters that remain in operation (these data were tracked by most smelters during the 1990s). If this is not feasible, the ERT recommends that Italy enhance the transparency of its inventory by adding more discussion as to why the current approach to estimating these emissions is conservative, including a comparison between the IPCC default EFs and the EFs used by Italy for 1990. In addition, if Italy wishes to show that its time series is conservative by comparing it to a time series using another approach, the ERT also recommends that Italy use default EFs from the IPCC good practice guidance for this alternate approach. The ERT further recommends that Italy explain in more detail in the NIR how the reporting company (Alcoa) estimated its PFC emissions (i.e. using technology-specific IPCC slope factors and facility-specific anode effect minutes) and why these emission estimates were higher for 2003 than for other recent years (i.e. because Alcoa used conservative assumptions to estimate the emissions for a three-month period for which no data were available).

4. Substitutes for ozone-depleting substances – HFCs

65. The ERT noted from the NIR that Italy had AD and EFs for several subcategories of the air-conditioning and refrigeration sector (domestic, small and large commercial, industrial chillers, and mobile air-conditioners); however, only aggregated information has been presented in the Party's CRF tables. The ERT also noted that, according to the notes under table 2(II).F, emissions from disposal of this equipment have been included with the emissions from "newly manufactured products"; in response to a question raised by the ERT, Italy clarified that these emissions had actually been included with the emissions during the products' life. The ERT recommends that Italy revise table 2(II).F to provide a more detailed breakdown of the AD and EFs for this category, and that the Party clarify that emissions from equipment disposal are included with the emissions during the products' life.

C. Non-key categories

1. Electrical equipment – SF₆

66. The method used to estimate recent emissions from electrical power systems has been indicated to be a tier 3c method (country-level mass-balance) in the Party's NIR; however, in response to questions raised by the ERT, Italy clarified that the tier 3c method was used only for medium voltage electrical equipment. Annual recharges were used to estimate emissions from electrical power systems. The ERT encourages Italy to clarify this in its NIR, including information on which IPCC method the Party's method corresponds to.

2. Production of hydrochlorofluorocarbon-22 – HFC-23

67. Italy has reported zero emissions of HFC-23 from production of hydrochlorofluorocarbon-22 for the period 1996–2007, stating that untreated streams are collected and sent to a thermal afterburner. Because abatement devices are likely to experience downtime during which HFC-23 is emitted unabated, the ERT asked the Party, during the review, whether the Italian production plant had measures in place to

⁸ The time series used in the comparison is based on EFs that decline and that are lower, for the years after 2000, than those in either the IPCC good practice guidance or the 2006 IPCC Guidelines. For example, Italy's tier 1 approach uses a CF₄ EF of 0.1 kg/t aluminium for the years after 2000; the lowest EF in the IPCC good practice guidance is 0.31 kg/t.

prevent this (e.g. equipment to recapture the gas). In response to this question, Italy reiterated the plant's confirmation that the thermal oxidizer was fully operational, but the Party did not provide any additional information. The ERT urges Italy, in its next NIR, to include information on how the plant avoids emitting HFC-23 during the oxidizer's downtime.

IV. Agriculture

A. Sector overview

68. In 2007, emissions from the agriculture sector amounted to 37,210.50 Gg CO₂ eq, or 6.7 per cent of total GHG emissions. Since the base year, emissions have decreased by 8.3 per cent. The key drivers for this emission trend are the 30.4 per cent and 13.0 per cent decreases in the dairy and non-dairy cattle populations, respectively; these reductions largely neutralized the increase in emissions per animal head. N₂O and CH₄ emissions accounted for 58.0 and 42.0 per cent of the sectoral emissions, respectively. Within the sector, the major category was agricultural soils, which accounted for 47.8 per cent of the emissions, while enteric fermentation accounted for 29.6 per cent and manure management for 18.4 per cent. Rice cultivation and field burning of agricultural residues accounted for 4.1 and 0.04 per cent of the sectoral emissions, respectively.

69. With regard to the agriculture sector, the Party's inventory is complete in terms of categories and GHGs. Uncertainties and QA/QC procedures have been described at the sectoral level. The inventory is transparent, as sources of AD have been identified and methodological issues have been clearly explained. Recalculations were performed to take into account slightly improved AD (average weight of animals, production of slurry and solid manure, nitrogen excretion rates, and rice production), leading to minor changes in the emission estimates compared with those in the 2008 submission. The impact of the recalculations was a less than 0.01 per cent decrease in the estimate of sectoral emissions for the base year and a 0.04 per cent decrease in these estimated emissions for 2006.

70. The ERT concluded that the quality of Italy's inventory for the agriculture sector had significantly improved in recent years, with both the results of different research projects (MeditAIRaneo project, and the convention signed between ISPRA and the Ministry for the Environment, Land and Sea) and the recommended improvements of previous ERTs having been incorporated into the inventory. The ERT noted that Italy intends to update and improve AD by means of the collaborative actions of national and regional entities. The ERT encourages Italy to continue its efforts in this regard and to report thereon, including any recalculations, in its next annual submission.

B. Key categories

1. Enteric fermentation – CH₄

71. Italy applied a tier 2 method and country-specific EFs to estimate emissions from cattle and buffalo, and a tier 1 method and default EFs to estimate emissions from the remaining categories of livestock, which is consistent with the IPCC good practice guidance. The ERT noted that the change to the EF for cow buffalo did not affect the CH₄ emission estimate.

72. The ERT also noted abrupt inter-annual changes in the data on Italy's sheep population: for example, a 14.9 per cent increase between 1993 and 1994, and a 25.0 per cent decrease between 2000 and 2001. In response to a question raised by the ERT, Italy explained that the whole time series had been provided by Istat and officially published and communicated at the national and international levels, and that these data were collected from periodical surveys and a 10-year census, as reported in the NIR. The methodologies for collecting data were developed in the context of the European Statistical System coordinated by EUROSTAT, and inter-annual variation is attributable not only to market demand and epidemic diseases but also to changes in the methodologies for collecting data.

2. Manure management – CH₄

73. Italy used a tier 2 method and country-specific EFs to estimate CH₄ emissions from cattle, swine and buffalo manure, and a tier 1 method and default EFs to estimate these emissions from the remaining categories of livestock, which is in line with the IPCC good practice guidance. The ERT noted that recalculations, undertaken owing to minor changes in the average slaughter weight of the animals in the 'less than one year' category and in the methane producing potential parameter for buffalo, had led to minor changes in the estimates of CH₄ emissions from manure management: no change in the estimate of emissions for the base year, but a 0.07 per cent increase in the emission estimate for 2006.

3. Manure management – N₂O

74. Italy applied a tier 2 method and a combination of default and country-specific EFs to estimate N₂O emissions from manure management, which is in line with the IPCC good practice guidance. The ERT noted that recalculations had led to minor changes in the emission estimates for this category: no change for the base year, but a 0.07 per cent decrease in the estimate of these emissions for 2006.

4. Agricultural soils – N₂O

75. Italy applied a tier 1 method and a combination of default and country-specific EFs to estimate N₂O emissions from agricultural soils, which is in line with the IPCC good practice guidance. The ERT recommends that Italy report the method used as "T1" instead of "D" in CRF summary 3 table. Recalculations undertaken led to minor changes in the emission estimates for this category: no change in the base year, but a 0.07 per cent decrease in the emission estimate for 2006.

76. Although it is applied to soils in Italy, the use of sewage sludge has been reported as not estimated ("NE"). In response to a question raised by the ERT, Italy indicated that the corresponding figures produced from 1996 onwards by the Ministry for the Environment, Land and Sea within the framework of Council directives 86/278/EEC and 91/692/EEC presented many inconsistencies, and that it was waiting for the results of a new specific study on land spreading that should be available at the end of the year, along with improved data officially collected by the Ministry. The ERT recommends that Italy validate the AD from the aforementioned study and report thereon in its next annual submission. In addition, the Party should include the use of sewage sludge in its reporting on the agriculture sector in its next NIR.

V. Land use, land-use change and forestry

A. Sector overview

77. In 2007, net removals from the LULUCF sector amounted to 70,909.82 Gg CO₂ eq. Since the base year, net removals have increased by 5.1 per cent. The key driver for the rise in removals is the increase in removals from cropland converted to grassland and from forest land remaining forest land. Within the sector, 71.7 per cent of the removals were from forest land remaining forest land, followed by 14.8 per cent from cropland remaining cropland, 10.6 per cent from land converted to grassland and 2.9 per cent from land converted to forest land. Emissions from land converted to settlements amounted to 3,181.5 Gg CO₂ eq. Emissions from wetlands and other land have been reported as not occurring.

78. The Party's inventory for the LULUCF sector (hereinafter referred to as the LULUCF inventory) has been prepared and documented in accordance with the IPCC good practice guidance for LULUCF. The NIR is well referenced and information has been illustrated using tables, equations and graphs, which help to make the LULUCF inventory transparent. However, the ERT identified areas for improvement to the LULUCF inventory in terms of its transparency and completeness (e.g. see paras. 79 and 80 below).

79. Although the Party's NIR is detailed and well illustrated, the ERT considers that its transparency could be improved in a number of areas, namely by: providing a description of the rules for land-use classification; elaborating on how the inputs are used in the equation to estimate the growing stock of Italy's forest; providing quantitative QA/QC validation indices for category-specific data (the Party was able to provide some more information in response to questions raised by the ERT during the review); and justifying in more detail the Party's approach of calculating changes in soil carbon stock in the year following land-use conversion, when the default of 20 years is specified by the IPCC good practice guidance for LULUCF. The ERT concluded that this approach could result in an underestimation of emissions during the first commitment period from land-use changes that have occurred since 1990.

80. The ERT noted gaps in the data in CRF table 5.B on net carbon stock changes for the category cropland remaining cropland (subcategory perennial). In response to a question raised by the ERT, the Party indicated that they inserted a value of 0 in the reporting software (as Parties are not required to estimate net carbon stock change for dead organic matter) and the reporting software converted this value into a blank cell which in turn was identified as a reporting gap. In this case, the ERT encourages Italy to include text in the NIR outlining where the reporting software has performed this conversion from a value of 0 to a blank cell with a view to minimizing misinterpretation in subsequent expert reviews.

81. Italy performed recalculations of the estimates in the LULUCF sector for the period 1990–2006, driven by the provision of new data on the area of forest land by the Italian Forest Service. In the data provided in the 2009 inventory submission, the area of forest land in the country has been reduced by 11.3 per cent compared with the area reported in the previous annual submission. This resulted in a reduction in size of each of the three carbon pools: by 6.6 per cent for living biomass, by 14.7 per cent for dead organic matter and by 15.3 per cent for soil carbon.

82. The ERT noted with concern that the Party's national registry for forest carbon sinks is not fully funded. This registry, which is part of the national system, was instituted by Ministerial Decree on 1 April 2008. In response to a question raised by the ERT with regard to the reporting requirements outlined in decision 15/CMP.1 and the definitions, modalities, rules and guidelines relating to LULUCF activities under Article 3, paragraphs 3 and 4, the Kyoto Protocol (decision 16/CMP.1), Italy clarified that three years' funding (established in the Party's Budget Law 2008) had been cut in summer 2008 by the country's new Government. This funding was meant to improve the quality and availability of AD and parameters deemed essential (by the Party) to meet Italy's obligations under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. A technical group consisting of experts from the relevant institutions (ISPRA, Ministry for the Environment, Land and Sea, Ministry of Agricultural, Food and Forestry Policies, and University of Tuscia) has produced a detailed and costed work plan. This work plan is being used to seek the required additional funds for the Party's national registry for forest carbon sinks, but as yet no decisions on funding have been made.

83. The ERT strongly recommends that Italy ensure, by whatever available means, that its national system has the capacity and required resources to plan, prepare and manage a KP-LULUCF inventory, noting that this reporting is mandatory under Article 7, paragraph 1, of the Kyoto Protocol, commencing with the annual submission due on 15 April 2010.

84. The Party has provided, in annex 10 to its NIR, an explanation of how it intends to meet the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1, and how this information will be reported, with specific reference to the outline included in the annex to decision 15/CP.10. The Party has not provided information on which carbon pools will not be accounted for, or on how harvesting of forests will be distinguished from deforestation, as required by the IPCC good practice guidance for LULUCF and decision 16/CMP.1.

B. Key categories

1. Forest land remaining forest land – CO₂

85. The Party used a regional-scale forest modelling system that establishes annual volume increments and then uses biomass expansion factors, wood densities, root-shoot ratios, a litter-above-ground carbon relationship and a soil-above-ground carbon relationship for 26 tree species in order to estimate annual carbon stocks for forest land remaining forest land. This modelling system establishes the carbon stock of the five forest carbon pools. The data used in the modelling system were based on forest inventory data for 1985 and 2005.

86. The ERT noted that the uncertainty of the five forest carbon pools was estimated to be 84.9 per cent. The present ERT reiterates the identification of the previous ERT that this uncertainty estimate has changed little since 1990, and recommends that Italy prioritize, within this sector, the improvement of the uncertainty analysis for the forest carbon pools.

87. Given the importance of forestry in Italy's LULUCF sector, and the role of the modelling system in estimating the annual pool-based carbon stock changes, the ERT recommends that the Party provide in its next annual submission a transparent validation of this system's ability to estimate these annual carbon stock changes.

2. Land converted to forest land – CO₂

88. The area of forest land in Italy increased by about 18 per cent (1,978 kha) between 1990 and 2007. The only land conversion to forest land that has been reported by the Party is grassland converted to forest land. Most of the carbon stock change reported for the category was associated with soil carbon in mineral soils. The Party has described in general terms in its NIR how the carbon stock changes in living biomass in young forests were estimated. The ERT recommends that the Party provide in its next annual submission a more transparent description of this estimation.

3. Land converted to grassland – CO₂

89. Only cropland (subcategory annual crops) has been converted to grassland in Italy. A perturbation to the trend in the time series for CO₂ emissions/removals from cropland converted to grassland occurred in 2003. In response to a question raised by the ERT on this matter, the Party stated that it was investigating how to smooth out this perturbation in order to harmonize the whole time series without compromising the integrity of the annual land-use matrices. The ERT recommends that the time series be harmonized for the Party's next annual submission.

4. Land converted to settlements – CO₂

90. Italy has reported an annual conversion of 8.3 kha land to settlements. Both cropland and grassland have been converted to settlements in the country. The present ERT noted that the previous ERT had welcomed the Party's efforts to improve its land-use tracking system so that it could be more definitive about which land types were converted to settlements on an annual basis. The ERT recommends that Italy further develop its capacity to identify land-use conversions to settlements and report thereon in its next annual submission.

VI. Waste

A. Sector overview

91. In 2007, emissions from the waste sector amounted to 18,459.31 Gg CO₂ eq, or 3.3 per cent of total GHG emissions. Since the base year, emissions have increased by 2.9 per cent. The key driver for

the rise in emissions is the increase in CH₄ emissions from wastewater handling. Within the sector, 72.3 per cent of the emissions were from solid waste disposal on land, followed by 24.1 per cent from wastewater handling, 3.6 per cent from waste incineration and 0.02 per cent from composting.

92. The ERT noted Italy's planned improvements to the category solid waste disposal on land, namely the revision, using newly acquired data, of important waste composition parameters, the fraction of CH₄ in the landfill gas and the amount of landfill gas collected and treated. The ERT also noted that Italy had completed its investigation into the CH₄ generation potential of landfilled construction and demolition waste. The ERT welcomes the above-mentioned planned improvements and recommends that Italy incorporate these revised data into its inventory for the waste sector, and report thereon, in its next annual submission. This reporting should include the transparent documentation of the new data, and a description of the impact of subsequent recalculations on the emission trend and on time-series consistency.

93. The ERT noted that the Party's tier 2 key category analysis had identified both CH₄ and N₂O emissions from wastewater handling as key categories. The increase in CH₄ emissions from wastewater treatment between 1990 and 2007 (by 446.86 Gg CO₂ eq or 22.5 per cent) contributed to the increase in the total emissions from the waste sector (by 523.68 Gg CO₂ eq between 1990 and 2007 or 3.9 per cent). However, some key parameters, such as the fraction of anaerobically treated industrial wastewater (15 per cent) and domestic and commercial wastewater (5 per cent), and the fraction of domestic and commercial wastewater treated in Imhoff tanks (2.4 per cent), were assumed to be constant between 1990 and 2007. The ERT encourages Italy to consider updating these key parameters.

94. The ERT noted that recalculations had been undertaken and reported for the category waste incineration. The impact of the recalculations was a 14.3 per cent increase in the estimate of emissions from waste incineration for 2006, and the recalculations have been reported due to the availability of new published information.

B. Key categories

1. Solid waste disposal on land – CH₄

95. In Italy, disposal of municipal solid waste in landfill sites is the main disposal practice, and the total CH₄ produced in landfill sites increased from 521.59 Gg CO₂ eq in 1990 to 979.93 Gg CO₂ eq in 2007 (87.1 per cent). However, the CH₄ emissions from landfill sites actually decreased after 2000 (from 677.17 Gg CO₂ eq in 2000 to 558.16 Gg CO₂ eq in 2007 (–17.6 per cent)). The main reason for this decline in emissions was the significant increase in CH₄ recovery over the same period (from 200.76 Gg CO₂ eq in 2000 to 421.77 Gg CO₂ eq in 2007 (110.1 per cent)). In response to a question raised by the ERT, Italy explained that the amount of CH₄ recovered was estimated from the amount of energy produced, the energy efficiency of the CH₄ recovered, the capitation efficiency, and the efficiency in recovering CH₄ for energy use. The ERT recommends that Italy include this information in its next annual submission.

96. Oxidation factors for managed and unmanaged landfill sites have not been reported in the Party's NIR. The ERT recommends that Italy explain its use of oxidation factors in its next NIR.

2. Wastewater handling – CH₄ and N₂O

97. No information has been provided by the Party in its NIR on the estimation of CH₄ emissions from domestic and commercial wastewater treatment, N₂O emissions from industrial wastewater treatment and CH₄ recovery from domestic and commercial sludge treatment. However, this information was provided by the Party in response to questions of the ERT during the course of the review. The ERT

recommends that Italy improve the transparency of its reporting by providing this information in its next annual submission.

C. Non-key categories

Waste incineration – CO₂, CH₄ and N₂O

98. Italy has reported emissions from waste incineration with energy recovery under the energy sector. However, the amount or fraction of incinerated industrial waste with and without energy recovery and the corresponding sources of information have not been reported by the Party. The ERT recommends that Italy provide information on the amount of incinerated industrial waste both with and without energy recovery, and provide sufficient relevant documentation, including references, in its next annual submission.

VII. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

99. Italy has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the SIAR on the SEF tables and their comparison report.⁹ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the recommendations contained in the SIAR.

100. Information on the accounting of Kyoto units has been prepared and reported in accordance with section I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraphs 88 (a)–(j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

2. National registry

101. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with decision 15/CMP.1. The ERT further noted from the SIAR and its findings that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. However, the SIAR identified that Italy should enhance, by its next annual submission: (a) the public information referred to in paragraph 46 of the annex to decision 13/CMP.1, by providing, through the user interface of its national registry, either a clear statement that no project under Article 6 of the Kyoto Protocol exists against which Italy has issued emission reduction units, or a complete list of such projects, including the detailed information described

⁹ The SEF table comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

in points (a)–(d) of that paragraph; and (b) the user interface of its registry, by providing public access to the holding and transaction information referred to in paragraph 47 of the annex to decision 13/CMP.1. The ERT recommends that Italy address these issues and report the results in its next annual submission.

102. The ERT also recommends that Italy report on any change(s) to public information, including any changes to the public information referred to in paragraph 101 above, in its next annual submission.

3. Calculation of commitment period reserve

103. Italy has reported its commitment period reserve in its 2009 annual submission. Italy reported its commitment period reserve to be 2,174,650,108 t CO₂ eq, as it is based on the assigned amount and not on the most recently reviewed inventory. The ERT agrees with this figure.

B. Changes to the national system

104. Italy reported no change in its national system compared with the previous annual submission. The ERT concluded that Italy's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

C. Changes to the national registry

105. Italy reported no change in its national registry compared with the previous annual submission. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

VIII. Conclusions and recommendations

106. Italy made its annual submission on 15 April 2009. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (CRF tables and NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol, namely information on the accounting of Kyoto Protocol units and information on changes in the national system and in the national registry. This is in line with decision 15/CMP.1.

107. The ERT concludes that the inventory submission of Italy has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is in general complete and the Party has submitted a complete set of CRF tables for the years 1990–2007 and an NIR; these are generally complete in terms of geographic coverage, years, sectors and gases. However, the ERT concluded that the completeness of the Party's inventory submission could be improved with regard to the reporting of the use of biomass in the category pulp, paper and print, which has currently been reported as "NE" in the energy sector, as a methodology for estimating emissions from this category is available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

108. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Italy did not report on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, nor information on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. Italy has reported in its 2009 annual submission that there has been no change in its national system or national registry since its previous annual submission.

109. Italy's inventory is in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. In most cases, higher-tier methods were used to estimate emissions from key categories. The ERT

commends Italy for its efforts to improve its estimates of emissions from the agriculture and waste sectors.

110. The Party's inventory submission includes EU ETS data, which were used for its estimations in the industrial processes sector. However, the ERT concluded that the transparency of the information on the use of these data was insufficient, particularly in the energy sector.

111. The ERT concluded that the funding issue referred to in paragraph 82 above concerning the Party's national registry for forest carbon sinks places at serious risk the reporting of information on LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, which is mandatory commencing with the annual submission due on 15 April 2010.

112. Italy has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

113. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, the ERT identified a key concern with regard to the requirement set out in paragraph 20 of the annex to decision 16/CMP.1 on the capacity of the national system to identify areas of land and land-use change.

114. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

115. In the course of the review, the ERT formulated a number of recommendations¹⁰ relating to the completeness and transparency of the Party's information presented in its annual submission. The key recommendations are that Italy:

- (a) Improve and complete its reporting on all LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, specifically with regard to the estimation of carbon stock changes for all carbon pools;
- (b) Provide information on the EU ETS data used in its inventory, as detailed in paragraph 11 above;
- (c) Prepare an NIR consistent with the outline set out in the UNFCCC reporting guidelines, specifically in respect to the energy sector (see paras. 43, 46 and 48 above).

IX. Questions of implementation

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

¹⁰ For a complete list of recommendations, the relevant chapters of this report should be consulted.

Annex I**Documents and information used during the review****A. Reference documents**

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>>.

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/landuse/gp/landuse.htm>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at <<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <<http://unfccc.int/resource/docs/cop8/08.pdf>>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for Italy 2009. Available at <<http://unfccc.int/resource/docs/2009/asr/ita.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <<http://unfccc.int/resource/webdocs/sai/2009.pdf>>.

FCCC/ARR/2008/ITA. Report of the individual review of the greenhouse gas inventories of Italy submitted in 2007 and 2008. Available at <<http://unfccc.int/resource/docs/2009/arr/ita.pdf>>.

UNFCCC. Standard independent assessment report, parts I and II. Unpublished document.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Riccardo De Lauretis (Institute for Environmental Protection and Research), including additional material on the methodology and assumptions used.

Annex II**Acronyms and abbreviations**

AAU	assigned amount unit	ICER	long-term certified emission reduction unit
AD	activity data	LULUCF	land use, land-use change and forestry
CER	certified emission reduction unit	m ³	cubic metre
CH ₄	methane	Mg	megagram (1 Mg = 1 tonne)
CO ₂	carbon dioxide	Mt	million tonnes
CO ₂ eq	carbon dioxide equivalent	Mtoe	millions of tonnes of oil equivalent
CRF	common reporting format	NA	not applicable
EC	European Community	N ₂ O	nitrous oxide
EIT	economy in transition	NIR	national inventory report
EF	emission factor	PFCs	perfluorocarbons
ERT	expert review team	PJ	petajoule (1 PJ = 10 ¹⁵ joule)
EU	European Union	QA/QC	quality assurance/quality control
F-gas	fluorinated gas	RMU	removal unit
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ , without GHG emissions and removals from LULUCF	SEF	standard electronic format
GJ	gigajoule (1 GJ = 10 ⁹ joule)	SF ₆	sulphur hexafluoride
GWP	global warming potential	SIAR	Standard independent assessment report
HFCs	hydrofluorocarbons	SO ₂	sulphur dioxide
IEA	International Energy Agency	tCER	temporary certified emission reduction unit
IPCC	Intergovernmental Panel on Climate Change	Tg	teragram (1 Tg = 1 million tonnes)
kg	kilogram (1 kg = 1 thousand grams)	TJ	terajoule (1 TJ = 10 ¹² joule)
kgoe	kilograms of oil equivalent	UNFCCC	United Nations Framework Convention on Climate Change
