COMPLIANCE COMMITTEE

CC/ERT/ARR/2010/36
24 November 2010

Report of the individual review of the annual submission of Italy submitted in 2010

Note by the secretariat

The report of the individual review of the annual submission of Italy submitted in 2010 was published on 22 November 2010. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2010/ITA, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

United Nations FCCC/ARR/2010/ITA

Framework Convention on Climate Change

Distr.: General
22 November 2010

English only

Report of the individual review of the annual submission of Italy submitted in 2010*

* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2010 annual submission of Italy, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 30 August to 4 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Suvi Monni (Finland) and Mr. Tinus Pulles (Netherlands); energy – Mr. Nicolas di Sbroivacca (Argentina) and Mr. Steven Oliver (Australia); industrial processes – Ms. Ils Moorkens (Belgium); agriculture – Ms. Olga Gavrilova (Estonia), Ms. Anoja Udaya Kumari Herath (Sri Lanka) and Ms. Tajda Mekinda-Majaron (Slovenia); land use, land-use change and forestry (LULUCF) – Mr. Héctor Ginzo (Argentina), Mr. Andis Lazdins (Latvia) and Ms. Kimberly Todd (United States of America); and waste – Ms. Kristin Hardardottir (Iceland) and Ms. Sirintornthep Towprayoon (Thailand). Ms. Towprayoon and Mr. Pulles were the lead reviewers. The review was coordinated by Mr. Matthew Dudley and Ms. Barbara Muik (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 2008, the main greenhouse gas (GHG) in Italy was carbon dioxide (CO_2), accounting for 86.4 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (6.6 per cent) and nitrous oxide (N_2O) (5.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.5 per cent of the overall GHG emissions in the country. Actual and potential emissions of fluorinated gases have been reported by the Party in its 2010 annual submission. The energy sector accounted for 83.6 per cent of total GHG emissions, followed by agriculture (6.6 per cent), industrial processes (6.3 per cent), waste (3.1 per cent) and solvent and other product use (0.4 per cent). Total GHG emissions amounted to 541,485.36 Gg CO_2 eq and increased by 8.5 per cent between the base year[2] and 2008. Between 2007 and 2008, total GHG emissions decreased by 2.0 per cent.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Table 3 provides information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 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
Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2008[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A sources		CO_2	435 775.28	435 775.28	445 861.39	463 602.86	490 476.80	486 342.51	476 749.38	468 067.67	7.4
		CH_4	41 563.78	41 563.78	43 788.40	43 962.86	38 541.79	36 833.91	36 917.58	35 975.56	–13.4
		N_2O	37 218.42	37 218.42	38 030.41	39 420.87	37 534.30	32 225.17	31 545.71	29 434.32	–20.9
		HFCs	351.00	351.00	671.29	1 985.67	5 267.03	5 956.20	6 700.69	7 379.22	2 002.3
		PFCs	1 807.65	1 807.65	490.80	345.85	352.62	282.30	287.78	194.41	–89.2
		SF_6	332.92	332.92	601.45	493.43	465.39	405.87	427.55	434.18	30.4
KP-LULUCF	Article 3.3[b]	CO_2								–1 736.00	
		CH_4								16.30	
		N_2O								1.65	
	Article 3.4[c]	CO_2	NA							–50 772.54	NA
		CH_4	NA							38.03	NA
		N_2O	NA							3.86	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation the base year and the inventory years of the commitment period must be reported.

Table 2
Greenhouse gas emissions by sector and activity, base year to 2008

			Gg CO_2 eq							*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A		Energy	418 576.51	418 576.51	431 427.80	450 807.70	473 902.36	469 217.22	459 055.94	452 907.35	8.2
		Industrial processes	37 507.63	37 507.63	34 945.96	35 189.63	40 945.63	36 420.18	36 944.47	34 099.10	–9.1
		Solvent and other product use	2 455.02	2 455.02	2 239.03	2 302.43	2 138.67	2 140.82	2 104.18	1 999.47	–18.6
		Agriculture	40 576.24	40 576.24	40 348.91	39 939.85	37 204.45	36 620.96	37 222.47	35 865.15	–11.6
		Waste	17 933.65	17 933.65	20 482.04	21 571.93	18 446.81	17 646.79	17 301.63	16 614.29	–7.4
		Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
		LULUCF	NA	–64 756.99	–82 447.34	–75 943.18	–91 963.55	–92 409.37	–52 268.02	–87 298.51	NA
		Total (with LULUCF)	**NA**	**434 358.41**	**426 514.36**	**452 296.43**	**462 227.57**	**451 989.81**	**500 360.67**	**454 186.86**	**NA**
		Total (without LULUCF)	**499 115.40**	**499 115.40**	**508 961.70**	**528 239.61**	**554 191.12**	**544 399.18**	**552 628.69**	**541 485.36**	**8.5**
KP-LULUCF	Article 3.3[b]	Afforestation & reforestation								–1 718.05	
		Deforestation								386.44	
		Total (3.3)								**–1 331.60**	
	Article 3.4[c]	Forest management								–50 730.65	
		Cropland management	NA							NA	
		Grazing land management	NA							NA	
		Revegetation	NA							NA	
		Total (3.4)	**NA**							**–50 730.65**	

Abbreviations: LULUCF = land use, land-use change and forestry, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[c] Elected activities under Article 3, paragraph 4 of the Kyoto Protocol, including forest management , cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation the base year and the inventory years of the commitment period must be reported.

Table 3
Information to be included in the compilation and accounting database in tonnes of CO_2 equivalent

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	2 174 650 108		2 174 650 108	
Annex A emissions for current inventory year				
CO_2	468 067 673		468 067 673	
CH_4	35 975 561		35 975 561	
N_2O	29 434 317		29 434 317	
HFCs	7 379 224		7 379 224	
PFCs	194 409		194 409	
SF_6	434 182		434,182	
Total Annex A sources	541 485 364		541 485 364	
Activities under Article 3, paragraph 3, for current inventory year				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–1 718 046		–1 718 046	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA		NA	
3.3 Deforestation for current year of commitment period as reported	386 444		386 444	
Activities under Article 3, paragraph 4, for current inventory year[d]				
3.4 Forest management for current year of commitment period	–50 730 651		–50 730 651	
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the ERT has calculated a or several adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3 and elected activities under Article 3, paragraph 4, if any.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2010 annual inventory submission contains a complete set of common reporting format (CRF) tables for the period 1990–2008, submitted on 14 April 2010, and a national inventory report (NIR), submitted on 15 April 2010. Italy submitted an updated version of the NIR on 22 July 2010. It also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 14 April 2010. The annual submission was submitted in accordance with decision 15/CMP.1.

7. In addition, the expert review team (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 their comparison report) and on the national registry.[3]

8. During the review, Italy provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

9. The inventory submission covers all sectors, source and sink categories and GHGs for the period 1990–2008 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 for 1990 and the period 2004–2008.

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

Overview

10. The ERT concluded that the national system continued to perform its required functions.

11. The Party reported that there is no change in its national system since the previous annual submission. The ERT agrees with this.

[3] The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 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.

Inventory planning

12. The NIR 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) 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 activity data (AD); selection of appropriate emission factors (EFs) and methodologies; reporting and quality management activities; management and implementation of the quality assurance/quality control (QA/QC) plan; and the archiving of the inventory. Furthermore, 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 preparation of emission and removals estimates for the LULUCF sector. The Ministry for the Environment, Land and Sea is responsible for the management of the national registry for forest carbon sinks, while ISPRA and the State Forestry Corps are used by this Ministry as technical scientific support for specific activities, as defined in the proposed relevant protocol that is under approval (see paragraph 23 (a)). Other agencies involved in the planning and preparation of the inventory include the National Statistical System (Sistan – coordinated by the National Institute of Statistics), the Ministry of Economic Development (energy balance), the Ministry of Transportation, the Italian Civil Aviation Authority, sectoral industrial associations and ISPRA (national waste cadastre).

Inventory preparation

Key categories

13. Italy has reported key category tier 1 and tier 2 analyses, both level and trend assessment, as part of its 2010 annual submission. The key category analysis performed by the Party and that performed by the secretariat[4] produced similar results. Italy has included the LULUCF sector in its key category analysis, which was performed in accordance with 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) 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).

Uncertainties

14. Italy prepared and has reported a tier 1 uncertainty analysis in accordance with the IPCC good practice guidance. The ERT noted that the Party concluded, on the basis of a comparison with a tier 2 analysis for CO_2 emissions from road transportation and N_2O emissions from agricultural soils, that both tiers of uncertainty analysis produced similar results. As a result of this conclusion, Italy sees no need to perform a higher tier uncertainty analysis. The present ERT reiterates and refines the recommendation of the previous ERT

[4] 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 Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. 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.

that Italy apply a full tier 2 uncertainty analysis for at least one inventory year in one annual submission to show that its conclusion holds true for all sectors.

Recalculations and time-series consistency

15. 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 1990–2007 have been undertaken to take into account: revised CO_2 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 (COPERT IV model used to estimate emissions from transport) (see para. 30 below); verified data from the European Union emissions trading scheme (EU ETS) on cement and lime production; a revised CO_2 EF for ferroalloys production; new data on manure management, rice production and agricultural soils; and revised data on wastewater handling and waste incineration. The major changes, and the magnitude of the impact, include: an increase in estimated total GHG emissions in the base year (0.1 per cent) and a decrease in 2007 (0.03 per cent). The rationale for these recalculations is provided in the NIR and in CRF table 8(b).

Verification and quality assurance/quality control approaches

16. Italy has included in its 2010 annual submission information on its QA/QC procedures, in line with the UNFCCC reporting guidelines. 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.

17. 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.

18. The ERT concluded that the Party's verification of its inventory is based on, among other activities, comparisons with plant-specific data and information obtained from the European Union (EU) directive on the limitation of emissions of certain pollutants into the air from large combustion plants, the European Pollutant Release and Transfer Register (E-PRTR) and the EU ETS. EU ETS data are used to compare and update EFs used in the industrial processes sector. In response to a recommendation of the previous ERT, Italy has improved its explanations of how EU ETS data have been used.

Transparency

19. The Party's 2010 annual submission is transparent, and Italy has addressed transparency issues raised in the previous annual review report.

Inventory management

20. Italy has a centralized archiving system, which includes the archiving of disaggregated EFs and 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, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. This archiving system was established and is maintained by ISPRA.

3. Follow-up to previous reviews

21. Italy has presented in its NIR an overview of the recommendations made in the previous annual review report. This overview includes a column describing the action taken

by Italy to follow up on each recommendation. All of the recommendations have been adequately responded to. The ERT commends Italy for this well-organized presentation of its follow-up to previous reviews, which is a very clear and transparent way of informing the reader.

22. However, recommendations concerning the prioritization of improvements to its uncertainty analysis, the enhancement of transparency with regard to net carbon stock changes in land converted to forest land, and the further justification of its approach of calculating changes in soil carbon stock in the year following land-use conversions have not been addressed by the Party in its 2010 annual submission.

4. Areas for further improvement

Identified by the Party

23. The 2010 NIR identifies several areas for improvement. The planning of these improvements explicitly takes into account the recommendations of previous ERTs and the Party's assessment of the most important weaknesses remaining in its latest annual submission:

(a) Italy will implement a new protocol between the Ministry of Environment, Land and Sea and the Ministry of Agriculture, Food and Forestry Policies with respect to the national registry for forest carbon sinks in order to improve the capacity to identify areas of land use 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 and removals, on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. This will ensure the availability of a new 2012 forest inventory;

(b) Improvements are expected in the agriculture sector following a review of the N_2O EFs for emissions from agricultural soils, and in the waste sector, owing to the availability of information on waste composition and other parameters following the entry into force of the EU landfill directive;

(c) With regard to the LULUCF sector, Italy expects to develop better estimates for biomass burning and forest fires.

Identified by the expert review team

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

(a) The ERT recommends that Italy implement its planned reallocation of emissions using EU ETS data within the petroleum refining subcategory for the entire time series, ensuring times-series consistency, following the IPCC good practice guidance;

(b) The ERT also recommends that Italy report in its next annual submission the use of reductants in iron and steel production under the industrial processes sector instead of under the energy sector, ensuring that there is no double-counting between the two sectors, and that, in doing so, the Party take account of the quantity of carbon stored in steel produced;

(c) The ERT recommends that Italy include more discussion in the NIR as to why the current approach to estimating PFC emissions from aluminium production is conservative;

(d) The ERT also strongly recommends that the Party explain the rationale behind and justify (theoretically and/or factually) its approach of accounting for all soil carbon stock changes as a result of a land-use conversion when the conversion takes place instead of spreading those changes across a number of years (20 years is the default period),

as this approach might lead to a loss of soil carbon and thus an overestimation of CO_2 removals.

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

B. Energy

1. Sector overview

26. The energy sector is the main sector in the GHG inventory of Italy. In 2008, emissions from the energy sector amounted to 452,907.35 Gg CO_2 eq, or 83.6 per cent of total GHG emissions. Since 1990, emissions have increased by 8.2 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, 35.3 per cent of the emissions were from energy industries, followed by 27.4 per cent from transport, 19.1 per cent from other sectors, 16.4 per cent from manufacturing industries and construction and 0.2 per cent from the category other (energy (1.A.5)). The remaining 1.6 per cent were fugitive emissions.

27. Italy's inventory for the energy sector is complete and generally transparent and has in general been prepared in accordance with the IPCC good practice guidance and the UNFCCC reporting guidelines. Transparency in the reporting on oil and natural gas (fugitive emissions) could be improved, as methods have not been clearly described at the activity level; the frequent use of the notation key "IE" (included elsewhere), such as for the aggregation of oil and gas exploration and venting under oil and gas production (fugitive emissions), makes it difficult to understand the methods applied. In addition, Italy has reported fugitive emissions from oil transport (loaded in tankers) and from the distribution and transmission of natural gas (CO_2). The ERT noted from the NIR that Italy intends to improve the documentation on the methods used for these activities and commends the Party for focusing its planned improvements in the area of fugitive emissions. Distribution of oil products and underground coal mining, sources of fugitive emissions (CO_2) for which no IPCC estimation methods are available, have been reported as not occurring ("NO") in the NIR and not applicable in the CRF tables. The ERT encourages Italy to resolve this discrepancy and to report thereon in its next annual submission.

28. The ERT commends Italy for responding to the recommendations of the previous ERT, including improving its discussion of emission trends. Other improvements identified by the ERT include the addition of information on category-specific QA/QC, the implementation of planned improvements for non-mobile sources and enhancing the description of the use of EU ETS data in the energy sector.

29. In response to a recommendation of the previous ERT, Italy has improved, in annex 2 to the NIR, the discussion of the methodology and data sources used to estimate emissions from electricity production. This has been achieved by providing a detailed comparison of the data from the Italian electricity transmission system operator Terna with national energy statistics, and a justification for using AD from Terna. Data on coal imports have also been included by source country. The ERT acknowledges the improved information that Italy has provided in the NIR relating to the consideration of the moisture and ash content of coal in determining its carbon content and lower heating values. The ERT welcomes this development.

30. Recalculations have been undertaken and reported by the Party in line with the IPCC good practice guidance and the UNFCCC reporting guidelines. Overall, the impact of the recalculations has been a 0.09 per cent decrease in the estimate of total GHG emissions

from the energy sector for 2009 and a 0.08 per cent increase for 2007. The most significant recalculation was a result of the update, taking into account revised EFs and parameters, of the COPERT IV model used to estimate emissions from road transportation, which resulted in decreases in emissions of 23.7 and 24.0 per cent for CH_4 and N_2O, respectively, for 2007, and decreases of 20.0 and 21.0 per cent for CH_4 and N_2O, respectively, for 1990. The ERT commends Italy for providing in the NIR a comprehensive discussion on recalculations at the category level. Italy also undertook a reallocation of the emission estimates for coke oven activities from the iron and steel subcategory to the manufacturing of solid fuels and other energy industries subcategory. The ERT commends Italy for improving the allocation of its emission estimates in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines).

31. Italy makes use of EU ETS data largely as a means of verification of the national energy balance AD, fuel types and EFs. In certain cases, such as for CO_2 EFs and oxidation factors for coal in electricity generation, EU ETS data have been used to create country-specific factors. The ERT commends Italy for responding to the recommendation made in the previous review report by providing descriptions of the use of EU ETS data at the category level for energy industries and manufacturing industries and construction.

32. The ERT noted that the use of EU ETS data for fugitive emissions from oil flaring activities has not resulted in a consistent time series as required by the IPCC good practice guidance. The CO_2 implied emission factor (IEF) jumps sharply from 2007 to 2008 from 2,541,500 to 6,338,800 kg CO_2/Mm^3. In response to a question raised by the ERT during the review week, Italy indicated that the EU ETS data for CO_2 emissions from flaring had been included for 2008 only. Italy also stated that the losses reported in the national energy balance are used as the basis for estimating total fugitive emissions from petroleum refining activities, while the EU ETS data were used to allocate those emissions to individual categories and not to change the estimate of total emissions. Italy noted that it intends to use EU ETS data for 2005 onwards for this purpose and has planned to update the whole times series. The ERT recommends that Italy implement its planned reallocation of emissions using EU ETS data within the petroleum refining subcategory for the entire time series, ensuring times-series consistency, in a manner consistent with the IPCC good practice guidance. In addition, the ERT recommends that Italy broaden its improvement plan to investigate other possible instances of where the use of EU ETS data may have resulted in time-series inconsistencies.

33. The ERT noted from the NIR that Italy intends to verify the AD used in relation to ship movements in recent years. The ERT encourages the Party to extend this verification to all years of the inventory time series and, where applicable, to report in its next annual submission on any recalculations undertaken thereafter and on time-series consistency.

2. Reference and sectoral approaches

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

34. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2008, there is a difference of –0.59 per cent between the CO_2 emission estimates calculated using the reference approach and the sectoral approach. The NIR provides explanations for the fluctuations in the differences between the estimates calculated using the two approaches over the years.

35. Italy's apparent fuel consumption corresponds to that reported to the International Energy Agency (IEA), with discrepancies within 5 per cent for all the available years. The total apparent fuel consumption reported in the CRF tables for 2008 is higher than that reported to IEA by 3 per cent, owing mainly to discrepancies in relation to crude oil

production and stocks of refinery feedstocks. A systematic bias can be observed, with IEA data always lower than the data in the CRF tables. For the period 1990–2008, the growth rate of the total apparent fuel consumption is 14 per cent (in the CRF tables) versus 16 per cent (IEA data). Italy has resolved a number of IEA/CRF data reconciliation issues relating to fuel use in aviation and navigation since the previous annual submission. However, some other, more general data reconciliation issues still remain; for example, the total apparent fuel consumption reported in the CRF tables is greater than the corresponding IEA data by 5 per cent for 1990 and by 3 per cent for 2008. In earlier stages of the review process, Italy responded to more specific issues, underlying discrepancies between the data reported by the Party in the CRF tables and IEA data. Minor discrepancies still remain for international aviation fuels.

International bunker fuels

36. Fuel consumption for international aviation, as reported in CRF table 1.C, is 5 per cent lower than according to IEA data from 1990 to 2000 and 2 per cent higher from 2004 onwards. For international marine bunkers, IEA figures are higher than those in the CRF tables by about 100 per cent until 1998. Part of the discrepancy is due to a different split between international and domestic navigation for both residual fuel oil and gas/diesel oil. Discrepancies exist between CRF tables 1.C and 1.A(b) in relation to residual fuel oil (international marine bunkers) for all years of the time series. Italy responded during the review that it will resolve this issue, and the ERT recommends that it do so in the next annual submission.

Feedstocks and non-energy use of fuels

37. The ERT commends Italy for correcting errors in CRF table 1.A(d) relating to units for fraction of carbon stored and carbon EFs. The ERT acknowledges that Italy has responded to a recommendation of the previous ERT by providing explanations in the NIR for the country-specific carbon storage factors that result from the use of national energy balance data. The ERT encourages Italy to further clarify its explanation of how it determines the final carbon storage factors that are used in CRF table 1.A(d) in order to improve understanding.

3. Key categories

Stationary combustion: solid fuels – CO_2

38. Italy has reported the reductants (coke) used in iron and steel production under the energy sector; however, the Revised 1996 IPCC Guidelines recommend that this be reported under the industrial processes sector. The ERT recommends that Italy report in its next annual submission the use of reductants in iron and steel production under the industrial processes sector instead of under the energy sector, ensuring that there is no double-counting between the two sectors.

39. In response to a question raised by the ERT during the review week on how Italy accounts for the sequestration of carbon in steel, the Party responded that its current method assumes that the carbon is emitted as CO_2, which results in an overestimation of around 100,000 Gg CO_2. The ERT recommends that, as a part of reallocating the emissions from the use of reductants in iron and steel production to the industrial processes sector, the Party amend its methodology to take account of the quantity of carbon stored in steel produced, in order to avoid a subsequent overestimation of CO_2 in the industrial processes sector.

Oil and natural gas: liquid fuels – CH_4 and CO_2

40. The methods used for estimating fugitive emissions from petroleum refining (process emissions resulting from restoration of the catalyst and flaring emissions) are not well documented in the NIR. In response to a question raised by the ERT during the review week, Italy indicated that total fugitive emissions from petroleum refineries are compared and balanced with the total crude oil losses reported in the national energy balance. These emissions are then distributed between the different process sources on the basis of average EFs agreed and verified with the national association of industrial operators (Unione Petrolifera) and updated annually, from the year 2000, on the basis of data supplied by the plants within the framework of the EU ETS. In the context of the EU ETS, refineries report CO_2 emissions from flaring and from processes separately. The ERT recommends that Italy include this information in the category-specific section on fugitive emissions in the NIR in order to improve the transparency of the description of methods.

Oil and natural gas: gaseous fuels – CH_4 and CO_2

41. The CH_4 IEF for natural gas production and processing declined from 2,911.93 kg/Mm^3 gas produced in 1990 to 1,611.10 kg/Mm^3 in 2008, while the CO_2 IEF stayed constant. During the review, Italy explained that gas operators supplied information about natural gas production and processing activities and CH_4 emissions in their environmental report. The CH_4 EFs for the whole time series were calculated taking into account this information. For CO_2, the IPCC default EF has not been modified, as no specific information is available. To improve transparency, the ERT recommends that Italy include this information in the NIR and also provide a discussion on the drivers behind this trend.

C. Industrial processes and solvent and other product use

1. Sector overview

42. In 2008, emissions from the industrial processes sector amounted to 34,099.10 Gg CO_2 eq, or 6.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 1,999.47 Gg CO_2 eq, or 0.04 per cent of total GHG emissions. Since the base year, emissions have decreased by 9.1 per cent in the industrial processes sector and by 18.6 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the decrease in emissions from chemical industry and metal production. The decrease in emissions from chemical industry is due mainly to the abatement systems installed in nitric and adipic acid production plants. Within the industrial processes sector, 63.1 per cent of the emissions were from mineral products, followed by 23.1 per cent from consumption of halocarbons and SF_6, 7.5 per cent from chemical industry and 6.3 per cent from metal production.

43. The reporting on the industrial processes sector in Italy's inventory is complete. Estimation approaches, information on data availability and relevant documentation have been, in general, transparently presented in the NIR. Detailed recommendations are provided in the category-specific paragraphs below.

44. 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 within the framework of the European Pollutant Emissions Register (EPER/E-PRTR) for some parts of its inventory.

2. Key categories

Adipic acid production – N_2O

45. The ERT noted that Italy has improved the documentation on this category in its NIR, in response to the recommendation made in the previous annual review report. New information has been incorporated into the 2010 NIR on the efficiency of the abatement technology and how this information is used when verifying emission estimates, which has enhanced the understanding of how the emissions from this category are estimated. However, the ERT recommends that Italy further improve transparency by correcting the formula that is reported in the NIR and explaining how this formula is used to check EFs provided by the production plant, and include a description of the emission estimation methodology applied by the production plant that was used by Italy for its 2010 annual submission.

Aluminium production – PFCs

46. For this category, emissions were estimated using a variant of the tier 1 methodology for the period 1990–1999 and a tier 2 methodology for the period 2000–2008. The default EFs used in the tier 1 approach were from the 2003 Aluminium Sector Greenhouse Gas Protocol rather than from the IPCC good practice guidance. The previous ERT recommended that Italy explore whether historical operating data were available to extend the use of the tier 2 methodology in order to estimate emissions for the whole time series; Italy did this but the result was negative. In the case that such data are not available, the previous ERT recommended that Italy enhance the transparency of its inventory by adding more discussion on why the current approach to estimating these emissions is conservative, including a comparison of 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 with a time series using another approach, the previous ERT recommended that Italy use default EFs from the IPCC good practice guidance for this alternate approach. According to its latest annual submission, Italy plans to follow these recommendations for its next submission. The ERT strongly recommends that Italy include the results in its next annual submission.

3. Non-key categories

Limestone and dolomite use – CO_2

47. Italy recalculated the emissions from this category to account for the emissions from paper production. However, the ERT noted that recalculations have only been performed for the period 2000–2008. The ERT recommends that Italy apply the recalculation also to the earlier years of the time series (1990–1999) to ensure consistency across the entire time series and the completeness of the coverage of the emission estimate. The impact of the recalculation was a 0.01 per cent increase in the emission estimate for 2007.

Aluminium production – CO_2

48. Italy has reported a recalculation of the emissions from this category resulting from an update of the EFs for aluminium production for the period 2002–2008 and the use of a tier 2 method to estimate the emissions in this time period. The updated EFs reflect new plant-specific information obtained from the relevant plant within the framework of EPER/E-PRTR. For the period 1990–2001,an EF of 1.55 t CO_2/t primary aluminium production was assumed (tier 1); this EF is the average of the EF contained in the Revised 1996 IPCC Guidelines (1.5 t CO_2/t primary aluminium production) and the corresponding EF from the 2003 Aluminium Sector Greenhouse Gas Protocol (1.6 t CO_2/t primary

aluminium production) for the pre-baked anode process. In previous annual submissions, Italy used the average EF for the entire time series. The ERT recommends that Italy recalculate emissions for the earlier years of the inventory time series, using the tier 2 method and plant-specific data to ensure time-series consistency, and report thereon in its next annual submission, including the impact of the recalculation on the earlier years of the time series. The ERT also recommends that Italy provide improved information relating to the justification of the approach used by the Party in the NIR and a discussion on the conservativeness of the time series.

D. Agriculture

1. Sector overview

49. In 2008, emissions from the agriculture sector amounted to 35,865.15 Gg CO_2 eq, or 6.6 per cent of total GHG emissions. Since the base year, emissions have decreased by 11.6 per cent. The key driver for the fall in emissions is the decline in the populations of dairy and non-dairy cattle and in the amount of synthetic fertilizer applied to agricultural soils. Within the sector, 46.8 per cent of the emissions were from agricultural soils, followed by 30.4 per cent from enteric fermentation, 18.8 per cent from manure management and 3.9 per cent from rice cultivation. The remaining 0.05 per cent were from field burning of agricultural residues.

50. The estimates of emissions from the agriculture sector were prepared using methods from the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, and the reporting is complete with respect to its coverage of activities, gases and years. Uncertainties, QA/QC procedures and planned improvements have been described at the sectoral level. The inventory is transparent, the estimates are consistent across the time series, the sources of AD and EFs have been identified and the methodological issues have been clearly explained in the NIR. Recalculations were carried out to take into account updated AD (on the population of rabbits and poultry, the fraction of livestock nitrogen that volatilizes as ammonia and N_2O, and the amount of synthetic fertilizer applied to agricultural soils), leading to minor changes in the emission estimates compared with those in the 2009 annual submission. The impact of the recalculations was a 0.00002 per cent decrease in the base year inventory and a 0.03 per cent increase in the 2007 inventory.

2. Key categories

Enteric fermentation – CH_4

51. Italy uses both tier 1 and tier 2 methods from the IPCC good practice guidance to estimate emissions for this key category: a tier 2 method is used to estimate emissions from cattle and buffalo using country-specific EFs, while a tier 1 method is used to estimate emissions from the remaining livestock types. This is in line with the IPCC good practice guidance. Italy uses livestock statistics from the Italian National Statistical System to determine the size of all livestock populations.

Manure management – CH_4

52. Italy uses a tier 2 approach and country-specific EFs to estimate CH_4 emissions from manure management for cattle, buffalo and swine. A tier 1 approach and the IPCC default EFs are used to estimate CH_4 emissions from manure management for the other livestock categories. The applied methods are in line with the IPCC good practice guidance and are well documented in the NIR.

Agricultural soils – N_2O

53. Italy uses a tier 1 method and a combination of IPCC default and country-specific EFs to estimate direct and indirect N_2O emissions from agricultural soils, which is in line with the IPCC good practice guidance. The ERT reiterates the recommendation made by the previous ERT that Italy report the method used as "T1" instead of "D" in CRF summary table 3.

54. For its 2010 annual submission, Italy used an updated fraction of livestock nitrogen excretion that volatilizes as ammonia and N_2O from the ammonia inventory under the Convention on Long-range Transboundary Air Pollution. The ERT noted that the resultant recalculations led to minor changes in the estimates of emissions for the agricultural soils category, namely a 0.2 per cent decrease in the estimates when compared with those in the 2007 inventory.

55. The ERT noted that Italy has reported N_2O emissions from sewage sludge under the waste sector. In response to a question raised by the ERT during the review week, Italy explained that there is no reliable information available to enable it to separate off the amount of sewage sludge that is applied to agricultural soils. However, the Party indicated that it was verifying the results of a recent study that will allow it to report a consistent time series of N_2O emissions from sewage sludge applied to agricultural soils, and that these results are likely to be included in its next annual submission. The ERT recommends that Italy provide in its next NIR sufficient information on the results of this study and the resulting estimation method, and that it provide information on any recalculations undertaken and their impact on the emission trend.

E. Land use, land-use change and forestry

1. Sector overview

56. In 2008, total net removals from the LULUCF sector in Italy amounted to 87,298.51 Gg CO_2 eq. Since the base year, total net removals have increased by 34.8 per cent. The key driver for the rise in removals is the increase in CO_2 removals from forest land remaining forest land. Within the sector, 64,642.26 Gg CO_2 eq were sequestered from forest land, followed by removals of 13,238.86 Gg CO_2 eq from cropland and 12,670.73 Gg CO_2 eq from grassland. Settlements were the only source of emissions in the sector, accounting for 3,253.34 Gg CO_2 eq. Emissions from wetlands and other land have been reported as "NO" and "NA", respectively.

57. With regard to the LULUCF sector, the NIR is well referenced and transparent. The text has been illustrated with graphs, tables and equations, which considerably improves the transparency of the LULUCF inventory. The ERT identified that the transparency could be further improved, however, by amending the mathematical expression for deriving the volume density of growing stock in forests. Improvements implemented by the Party in response to recommendations made in the previous annual review report include the addition of a description of the rules for land-use classification and an explanation of how inputs should be used in the equation for estimating the growing stock of Italy's forests.

58. The ERT noted that the Party has not established a defined procedure for performing the QA evaluation of the LULUCF inventory. During the review, the Party informed the ERT that, for all LULUCF categories, several QA activities are carried out in the different phases of the inventory process, pointing out that the applied methodologies have been presented and discussed at several national workshops and expert meetings. The ERT commends the third-party review of the LULUCF inventory, but it is not evident that there

is a standard system for periodic QA. The ERT encourages the Party to further improve the QA of its LULUCF inventory and to report thereon in its next annual submission.

59. The estimation of changes in soil carbon stocks has been well described in the NIR. The Party has explained in the NIR that when conversion of land from one land-use category to another occurs, the subsequent carbon stock changes in the soil are assumed to occur entirely in the year following the year in which the land-use conversion took place. Italy has referred to several scientific publications (Davidson and Ackerman, 1993; Olson, 1963; Guo and Giffort, 2002; Post and Kwon, 2000; and Reeder, 1998) to explain that both carbon losses and gains occur during the first few years after land-use conversion, noting, however, the high uncertainties. The ERT noted that the default method of the IPCC good practice guidance for LULUCF assumes that the carbon stock change in soils, following land-use conversion, occurs over the subsequent 20 years. Italy has also mentioned this default value in the NIR but has explained that, based on the above-mentioned scientific studies, it is more relevant to allocate all the emissions or removals to the year following the year in which the land-use conversion took place. The ERT recommends that the Party provide more data and information to support this assumption.

60. The LULUCF inventory is complete, consistent and comparable.

61. Following the recommendations of the previous ERT, the Party improved the application of the definition of forest land in its estimation of emissions and removals from the LULUCF sector, and recalculated CO_2 losses after receiving updated AD on forest harvests. For forest land, this has resulted in a decrease in the estimated carbon stock changes in the carbon pools, in the range of –30 per cent in the living biomass pool to –26 per cent in the dead organic matter pool. This is primarily driven by the reallocation of plantations to cropland and grassland. Within the estimates for those land-use categories, corresponding increases in net carbon removals have been reported. This reallocation seems reasonable given the Party's definition of forest land.

62. The overall uncertainty of the five forest carbon pools was estimated to be 84.9 per cent. The ERT recommends that Italy prioritize, within this sector, the improvement of the uncertainty analysis for the forest carbon biomass pools. The ERT also recommends that the Party reconsider the mathematical approach used to compute the association between carbon stock in living biomass and litter, because the uncertainty values associated with the models currently used are rather large. According to the IPCC good practice guidance for LULUCF, litter "includes all non-living biomass with a diameter less than a minimum diameter chosen by the country (for example 10 cm), lying dead, in various states of decomposition above the mineral or organic soil". Given that the litter layer might contain most of the harvesting residues and, therefore, contain the largest carbon stock in final felling sites and young stands regenerated after commercial harvesting, the Party should evaluate whether using a different mathematical approach (e.g. the comparison of carbon stocks with age and site type of forest stand) could improve the uncertainty levels.

63. The Party has improved the quality of the LULUCF inventory by making greater use of country-specific EFs and providing a transparent representation of land use and land-use changes. However, the level of uncertainty of recalculated values is still high, owing to the relatively large uncertainties of EF values. The ERT encourages the Party to continue improving the country-specific methods and EFs used.

2. Key categories

Forest land remaining forest land – CO_2

64. The total net removals of CO_2 from this category amounted to 63,026.11 Gg CO_2 in 2008; this accounted for 97.4 per cent of the total CO_2 removals from the forest land category. The level of CO_2 removals from forest land remaining forest land in 2008 was 49.6 per cent higher than in 1990 and 99.8 per cent higher than in 2007.

65. For estimating changes in the carbon pools, the Party uses a tier 3 regional-scale forest modelling system that computes annual tree-volume increments, and then uses country-specific biomass expansion factors and tree parameters together with least-square regressions between above-ground carbon stocks and either litter or soil carbon stocks.

66. The Party has provided a satisfactory validation of the modelling system used for estimation of carbon stock changes. However, the ERT recommends that Italy improve its documentation on the underlying model, including information on equations used (e.g. yearly increase of growing stock per ha).

Cropland remaining cropland – CO_2

67. Tier 1 and tier 3 methods were used to calculate carbon stock changes for this category. Changes in litter and soil carbon in mineral soils in plantations were estimated using linear regression with above-ground biomass. The ERT recommends that the Party enhance transparency by providing statistical information about the applied model, in particular coefficients of determination, standard error of the estimate, number of samples, etc., in tables 7.18, 7.19 and 7.20 of the NIR. The ERT appreciates that the Party provided some of this information during the review week upon request, and recommends that the Party include this information in its next annual submission.

68. The ERT noted examples of the use of the notation key "NO" in the reporting of this category in the relevant CRF tables, in particular for net carbon stock changes in organic soils, whereas the NIR includes a description of the relevant estimation methodology. The ERT recommends that the Party check consistency between the NIR and the CRF tables in this regard.

Grassland remaining grassland – CO_2

69. For this category, all carbon pools were measured using IPCC tier 1 or tier 2 methods. The largest carbon stock change was found in mineral soils (61.8 per cent of the total change in carbon stocks), followed by net living biomass (27.6 per cent).

70. The size of Italy's grassland areas was determined on the basis of national statistics related to grazing lands, forage crops, permanent pastures, and lands once used for agricultural purposes. The subcategory other wooded land (shrubland in the NIR) has been transferred from the forest land remaining forest land category to grassland remaining grassland to include areas of land which do not fit the current forest definition. A linear interpolation between the data for 1985 and 2005 was used to estimate data for the period 2006–2008.

71. Tier 1 and tier 2 methods are used to calculate carbon stock changes for this category. Changes in litter and soil carbon in mineral soils are estimated using linear regression with above-ground biomass. The ERT recommends that the Party enhance transparency by providing information on the statistical verification of the applied model, in particular coefficients of determination, standard error of the estimate, number of samples, etc., in tables 7.25, 7.26 and 7.27 of the NIR. While the ERT appreciates that the Party provided some of this information during the review week upon request, it encourages the

Party to regularly include information related to the goodness of fit and variance of regression models in its future NIRs.

72. The Party has not reported emissions from wildfires or biomass burning on grassland remaining grassland. It is not clear to the ERT whether these activities are indeed "NO", given that wildfires are affecting forest land in the country and could spread to grassland, particularly shrubland. The ERT recommends, if emissions from wildfires on grassland, cropland and wetlands are already included in the estimates of emissions from forest fires, that the notation keys in the CRF tables be updated. If this is not the case, the ERT recommends that the Party provide further evidence to support the justification that fires are not occurring on land under these other land-use categories.

Land converted to grassland – CO_2

73. Carbon stock changes in both living biomass and soils were estimated using tier 1 methods. The Party has reported that there were no carbon stock changes in dead organic matter.

74. In response to an issue raised by the previous ERT in relation to fluctuation of land-use changes over the time series, the Party has harmonized the whole time series so that the rate of conversion to grassland smoothly increases from 1996 onwards, without compromising the integrity of the annual land-use matrices.

75. The Party assumes that changes in carbon stocks occur in the first year after the land-use conversion, rather than considering them over the time period specified by the IPCC good practice guidance for LULUCF (20 years as default). As a result of this assumption, carbon stock changes in mineral soils were estimated as high as 14.12 t C ha^{-1} yearly, which is far higher than biological values and might lead to considerable overestimations of removals in the case of conversion from cropland to grassland. The ERT recommends that the Party revise or further justify this assumption to avoid the possible overestimation of removals.

3. Non-key categories

Land converted to forest land – CO_2

76. The area of forest land in Italy increased by 2,056.89 kha between 1990 and 2008. The 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 present ERT commends the Party for addressing the recommendation of the previous ERT that it describe in a more transparent way the calculation of carbon stock changes in living biomass.

F. Waste

1. Sector overview

77. In 2008, emissions from the waste sector amounted to 16,614.29 Gg CO_2 eq, or 3.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 7.4 per cent. The key driver for the fall in emissions is the decrease in emissions from solid waste disposal on land. Within the sector, 66.7 per cent of the emissions were from solid waste disposal on land, followed by 29.4 per cent from wastewater handling and 3.9 per cent from waste incineration. The remaining 0.03 per cent were from composting.

78. The ERT noted from the Party's 2010 annual submission that Italy is undertaking an investigation on waste composition with a view to providing improved information on

waste composition, the fraction of CH_4 in landfill gas and the amount of landfill gas collected and treated. Italy has also established a central database that contains information on waste sent to landfill. The ERT welcomes these ongoing improvements and encourages the Party to report on developments in this investigation in its next annual submission.

79. Italy has reported that recalculations were performed to revise the estimates of emissions from landfills (using new data on the amount of sludge going to landfill), wastewater handling (using new AD on the amount of the population connected to treatment systems) and waste incineration (using new AD). These recalculations resulted in increases of 0.001 per cent and 0.21 per cent in these emission estimates for the base year and for 2007, respectively.

2. Key categories

Solid waste disposal on land – CH_4

80. Italy uses the tier 2 method to estimate CH_4 emissions from solid waste disposal on land, using country-specific AD and a combination of country-specific EFs and IPCC default values. The ERT commends Italy for its implementation of the recommendation of the previous ERT in relation to including in the NIR information on how the amount of CH_4 recovered was estimated from the amount of energy produced. The ERT encourages Italy to include an explanation of the finding of the energy conversion efficiency factor used to calculate the CH_4 recovered in the NIR of its next annual submission.

81. The ERT noted that tables with emissions data for solid waste disposal on land have been included in the uncertainty and time-series consistency chapter of the NIR. The ERT recommends that these tables be moved to before the uncertainty and time-series consistency chapter in order to improve transparency.

82. Oxidation factors for managed and unmanaged landfill sites have been reported in the 2010 annual submission and this improvement is welcomed by the ERT.

Wastewater handling – CH_4 and N_2O

83. The ERT welcomes the improved documentation in the NIR on how CH_4 and N_2O emissions from wastewater handling are estimated, including the information provided on the estimation of CH_4 emissions from domestic and commercial wastewater treatment, N_2O emissions from industrial wastewater treatment and CH_4 recovery from domestic and commercial sludge treatment.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

84. The present ERT commends Italy for its implementation of the recommendation of the previous ERT in relation to improving the transparency of its reporting by including in the NIR the amount of incinerated industrial waste with and without energy recovery.

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

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

85. Under Article 3, paragraph 3, of the Kyoto Protocol, Italy has reported emissions and removals from afforestation, reforestation and deforestation. Under Article 3, paragraph 4, Italy has reported emissions and removals from forest management. The estimation of emissions and removals under Article 3, paragraphs 3 and 4, are consistent with the IPCC good practice guidance for LULUCF. The ERT concluded that Italy's annual submission on KP-LULUCF is in accordance with the requirements of paragraphs 5 to 9 of the annex to decision 15/CMP.1.

86. Methods of estimating carbon stock changes have been applied, taking into account the IPCC good practice guidance for LULUCF and recognizing the principles laid out in decision 16/CMP.1. Carbon stock changes as a result of the activities under Article 3, paragraphs 3 and 4, are estimated using the same methods as used for the LULUCF inventory. A growth model is used to estimate the net change of carbon in above- and below-ground biomass, dead wood and litter, and soils. The model was applied at a regional scale. Input data for the forest area per region and inventory typologies were from the First Italian National Forest Inventory and the 2005 Inventory of Forests and Carbon pools. No detailed information on carbon stock changes in carbon pools are available for deforested area; therefore, a conservative approach was applied, assuming that the total deforested area has been converted into settlements and the carbon stock changes owing to deforestation are computed assuming that the total amount of carbon in all pools before deforestation is lost.

87. Italy implements reporting method 1 for lands subject to activities under Article 3, paragraphs 3 and 4. The boundaries of the reporting areas have been identified in line with the administrative boundaries of the Italian regions (NUTS2). The same geographical boundaries were used for activities under both Article 3, paragraph 3, and Article 3, paragraph 4. Data on land use and land-use changes were obtained using a statistical approach from the 1985 and 2005 Italian National Forest Inventories, except for data on deforestation, which were derived from administrative records collected by the National Institute of Statistics. The spatial assessment unit to determine the area of units of land subject to activities under Article 3, paragraph 3, is 0.5 ha, which is the same as the minimum area of forest.

88. The ERT noted from chapter 10 of the Party's NIR that all forests fulfilling the definition of forest are considered as managed and are under forest management. Therefore, the entire Italian forest area is considered to be managed forest land. According to the assumption that all Italian forests are managed, the whole area subject to afforestation and/or reforestation should be reported under Article 3, paragraph 3, units of land otherwise subject to forest management. Only forest management has been elected under Article 3, paragraph 4. As deforestation is a permanent loss of forest cover, any unit of land that has been deforested under Article 3, paragraph 3, cannot also be subject to forest management under Article 3, paragraph 4.

89. According to the definitions provided in the NIR, forest is land which corresponds to the following threshold values: minimum tree height of 5 m; minimum area of land of 0.5 ha; and tree crown cover of 10 per cent. Forest roads, cleared tracts, firebreaks and other open areas within the forest, as well as protected forest areas, are included in the area defined as forest.

90. All carbon pools (above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon) were accounted for in the inventory for all activities under Article 3, paragraphs 3 and 4. Carbon stock changes in organic soils have been reported as "NO". CO_2 emissions from biomass burning have been reported as included elsewhere under above-/below-ground biomass losses.

91. The ERT noted from the NIR that Italy did not factor out removals from elevated CO_2 concentrations, indirect nitrogen deposition or the dynamic effects of age structure resulting from activities prior to 1 January 1990, although it takes into consideration that the IPCC good practice guidance for LULUCF does not provide methods for such factoring out.

92. Estimates of emissions from activities under Article 3, paragraphs 3 and 4, are clearly distinguished from anthropogenic emissions from the sources listed in Annex A to the Kyoto Protocol.

93. There is no debit incurred under Article 3, paragraph 3, of the Kyoto Protocol.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

94. In line with the provisions included in paragraph 8 (a) of the annex to decision 15/CMP.1, Italy has reported in the NIR that data from the national forest inventories are used as the basis for determining whether activities under Article 3, paragraph 3, occurred on or after 1 January 1990. The following afforestation activities that occurred or could have occurred on or after 1990 have been included in the reporting of such activities: (a) planted or seeded croplands; (b) planted or seeded grasslands; and (c) abandoned arable lands which are naturally forested. Also, in line with the aforementioned provisions, Italy has reported that land under all land-use categories is considered to be managed; therefore, any land-use changes occurring between managed lands are considered to be direct human-induced conversions.

95. In line with the provisions included in paragraph 8 (b) of the annex to decision 15/CMP.1, Italy has reported in its NIR that land-use changes after disturbances do not occur. Harvesting is regulated by regional rules which establish procedures to follow in case of harvesting. Deforestation is allowed only in very limited circumstances and has to follow administrative regulations to be permitted.

96. It has been reported that no units of land have been harvested since the beginning of the commitment period.

Afforestation and reforestation – CO_2

97. The total area reported under the activity is 1,387.23 kha, with total net removals of 1,718.05 Gg CO_2 eq. Tier 2 methods are used to estimate carbon stock changes in all carbon pools. A tier 1 method, with country-specific AD, is used to estimate non-CO_2 emissions from biomass burning. The following afforestation and reforestation activities that occurred or could have occurred on or after 1990 are included in the reporting of activities under Article 3, paragraph 3: (a) planted or seeded croplands; (b) planted or seeded grasslands; and (c) abandoned arable lands which are naturally forested.

98. The methods of calculation have been considerably improved; however, they are still not completely transparent. In particular, the ERT noted that the average factor used to identify carbon stock changes in mineral soils due to afforestation is 0.26 Gg/area unit, whereas the factor used in the Party's reporting under the Convention is 4.73 Gg/area unit. The ERT recommends that the same calculation methods be used for the reporting, both under the Convention and the Kyoto Protocol, or otherwise the inconsistency should be explained. In particular, the ERT recommends that the Party describe if the one year

stabilization of the carbon stock approach is also being used for estimation of emissions under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

99. The ERT identified inconsistencies in the factors used for the estimation of carbon stock change in living biomass and dead organic matter between the reporting under the Convention and the reporting on KP-LULUCF under Article 3, paragraph 3. The Party informed the ERT during the review that some calculation errors had been identified, but the Party decided not to resubmit data before the review, as there is a plan to completely revise the estimation model used on the basis of the new data coming from the national registry for forest carbon sinks. The ERT recommends that the Party rectify these inconsistencies and report thereon in its next annual submission.

Deforestation – CO_2

100. The total area deforested since 1990 is 13.0 kha. All forests are assumed to have been converted to settlements. The ERT recommends that the Party provide a more detailed explanation in its next annual submission as to how this assumption is in line with the statistical data used for the estimation of the deforested areas.

101. Deforestation is a net source of emissions, contributing 386.44 Gg CO_2 eq. A conservative approach is used to estimate the carbon stock changes in deforested areas, assuming that all organic carbon existing in the different pools before deforestation is lost. However, it is not clear from the NIR how the initial status of these pools is estimated. The ERT recommends that Italy clarify this methodological issue in its next annual submission.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

102. The area reported under forest management activities is 7,450.57 kha, contributing 50,730.65 Gg CO_2 net removals. Tier 2 methods are used to estimate carbon stock changes in all carbon pools. A tier 1 method, with country-specific AD, is used to estimate non-CO_2 emissions from biomass burning. As noted in the Party's reporting under the Convention in the NIR, the uncertainty level of these calculations is high. The ERT encourages the Party to check the estimation method for these uncertainties and aim to reduce uncertainty, as the Party has stated that it will do in the NIR.

103. Taking into account that the Party includes forest roads and firebreaks within the area of forest land, the ERT recommends that the Party, in order to enhance transparency, provide in its next NIR an explanation of how the emissions are accounted for in the case of the construction of new forest roads and firebreaks.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

104. 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 the SEF comparison report.[5] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

[5] The SEF 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.

105. Information on the accounting of Kyoto units has been prepared and reported in accordance with chapter 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 paragraph 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. Information reported by the Party on records of any discrepancies or non-replacement was found to be consistent with information provided to the secretariat by the ITL.

National registry

106. 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 the annex to decision 15/CMP.1. The ERT further noted the SIAR and its finding 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.

107. The national registry has fulfilled the requirements regarding the public availability of information in accordance with chapter II.E of the annex to decision 13/CMP.1. However, the ERT reiterates the recommendation contained in the SIAR in relation to the confidentiality of publicly available information, and recommends that Italy provide a clear statement on its website indicating which information required by chapter II.E of the annex to decision 13/CMP.1 is deemed confidential and a citation or reference to the relevant legislation or regulations supporting this confidentiality.

Calculation of the commitment period reserve

108. Italy has reported its commitment period reserve in its 2010 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (2,174,650,108 t CO_2 eq), as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

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

4. Changes to the national registry

110. Italy reported that there is no change in its national registry since 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 decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

111. Italy has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its 2010 annual submission.

112. The reported information is considered to be complete and transparent.

113. Italy has reported on: the assessment of social, environmental and economic effects of clean development mechanism projects; funding, strengthening capacity and transfer of technology; and priority actions in implementing its commitments under Article 3, paragraph 14. These priority actions include:

(a) The progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all GHG-emitting sectors, taking into account the need for energy price reforms to reflect market prices and externalities;

(b) Cooperation in the development, diffusion and transfer of advanced fossil-fuel technologies which emit less GHG emissions, and/or technologies relating to fossil fuels that capture and store GHGs, and the encouragement of their wider use;

(c) Facilitating the participation of the least developed countries and other Parties not included in Annex I to the Convention in this effort;

(d) Strengthening the capacity of developing countries to improve efficiency in upstream and downstream activities relating to fossil fuels, taking into consideration the need to improve the environmental efficiency of these activities;

(e) Assisting developing country Parties which are highly dependent on the export and consumption of fossil fuels in diversifying their economies.

III. Conclusions and recommendations

114. Italy made its annual submission of CRF tables and NIR on 14 and 15 April 2010, respectively. Italy submitted a revised NIR on 22 July 2010. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry, and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This is in line with decision 15/CMP.1.

115. 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 complete and the Party has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as complete in terms of categories and gases.

116. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

117. The Party'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.

118. The ERT concluded that Italy's annual submission on KP-LULUCF is in accordance with the requirements of paragraphs 5 to 9 of the annex to decision 15/CMP.1. The

KP-LULUCF inventory for activities under Article 3, paragraph 3, and for forest management elected under Article 3, paragraph 4, of the Kyoto Protocol was prepared in line with the IPCC good practice guidance for LULUCF using reporting method 1.

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

120. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

121. 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.

122. Italy has reported the information requested in chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", as part of its 2010 annual submission. The information was provided on 15 April 2010 and is complete and transparent.

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

(a) Implement its planned reallocation of emissions using EU ETS data within the petroleum refining subcategory for the entire time series;

(b) Report in its next annual submission the use of reductants in iron and steel production under the industrial processes sector instead of under the energy sector;

(c) Explore whether historical operating data used to estimate PFC emissions from aluminium production are available to extend the use of the tier 2 methodology to the whole time series;

(d) Further improve the QA of its LULUCF inventory and report thereon in its next annual submission;

(e) Improve documentation in its next annual submission on the accounting of all soil carbon stock changes as a result of a land-use conversion.

IV. Questions of implementation

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

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. *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/gpglulucf/gpglulucf.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 2010. Available at <http://unfccc.int/resource/docs/2008/asr/ ita.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <http://unfccc.int/resource/webdocs/sai/2010.pdf>.

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

UNFCCC. *Standard Independent Assessment Report*, Parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

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 methodologies and assumptions used.

Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
EPER	European Pollutant Emissions Register
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
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
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	International transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	Emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
m^3	cubic metre
NA	not applicable
N_2O	nitrous oxide
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change