United Nations

FCCC/ARR/2011/ITA

Framework Convention on Climate Change

Distr.: General
21 September 2012

English only

Report of the individual review of the annual submission of Italy submitted in 2011*

* In the symbol for this document, 2011 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 2011 annual submission of Italy, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 12 to 17 September 2011 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Anna Romanovskaya (Russian Federation) and Ms. Kristina Saarinen (Finland); energy – Mr. Steven Oliver (Australia) and Mr. Pedro Torres (Portugal); industrial processes – Ms. Lisa Hanle (United States of America) and Mr. Samir Tantawi (Egypt); agriculture – Mr. Sorin Deaconu (Romania) and Mr. Dionisio Rodríguez (Spain); land use, land-use change and forestry (LULUCF) – Mr. Xiaoquan Zhang (China) and Mr. Vladimir Korotkov (Russian Federation); and waste – Mr. Baek Wonsoek (Republic of Korea). Ms. Romanovskaya and Mr. Zhang were the lead reviewers. The review was coordinated by Mr. Vitor Gois Ferreira (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), 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 2009, the main greenhouse gas (GHG) in Italy was carbon dioxide (CO_2), accounting for 85.0 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (7.6 per cent) and nitrous oxide (N_2O) (5.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.8 per cent of the overall GHG emissions in the country. The energy sector accounted for 82.8 per cent of total GHG emissions, followed by agriculture (7.0 per cent), industrial processes (6.1 per cent), waste (3.7 per cent) and solvent and other product use (0.4 per cent). Total GHG emissions amounted to 491,119.58 Gg CO_2 eq and decreased by 5.4 per cent between the base year[2] and 2009. Between 2008 and 2009, total GHG emissions decreased by 9.3 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 and activity, 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.

[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 2009[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A sources		CO_2	435 894.77	435 894.77	445 959.30	463 669.78	490 118.99	476 226.04	466 004.25	417 212.41	–4.3
		CH_4	43 524.41	43 524.41	44 132.06	45 648.74	40 985.94	39 211.02	38 105.44	37 297.06	–14.3
		N_2O	37 245.92	37 245.92	38 095.74	39 497.34	37 568.25	31 561.99	29 490.10	27 821.77	–25.3
		HFCs	351.00	351.00	671.29	1 985.67	5 400.56	6 855.26	7 512.98	8 172.52	2 228.4
		PFCs	1 807.65	1 807.65	490.80	345.37	353.94	287.10	200.59	217.81	–88.0
		SF_6	332.92	332.92	601.45	493.43	465.39	427.55	435.53	398.02	19.6
KP-LULUCF	Article 3.3[b]	CO_2							–5 958.28	–6 340.60	
		CH_4							16.30	16.47	
		N_2O							1.65	3.85	
	Article 3.4[c]	CO_2	NA						–51 162.15	–48 493.52	NA
		CH_4	NA						38.03	38.44	NA
		N_2O	NA						3.86	3.90	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 2009[a]

			Gg CO_2 eq								*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A		Energy	418 544.70	418 544.70	431 380.14	450 764.03	473 538.38	458 519.07	450 802.25	406 743.19	–2.8
		Industrial processes	37 673.04	37 673.04	35 110.72	35 314.64	41 107.89	37 143.57	34 286.18	29 939.54	–20.5
		Solvent and other product use	2 455.02	2 455.02	2 234.94	2 302.43	2 138.88	2 104.25	1 998.10	1 861.59	–24.2
		Agriculture	40 622.55	40 622.55	40 435.25	40 043.90	37 288.75	37 310.62	35 949.71	34 481.12	–15.1
		Waste	19 861.36	19 861.36	20 789.60	23 215.36	20 819.18	19 491.45	18 712.66	18 094.14	–8.9
		LULUCF	NA	–61 795.08	–79 923.79	–78 891.21	–90 542.40	–73 310.29	–92 827.82	–94 670.97	NA
		Total (with LULUCF)	**NA**	**457 361.60**	**450 026.86**	**472 749.13**	**484 350.67**	**481 258.66**	**448 921.08**	**396 448.61**	**NA**
		Total (without LULUCF)	**519 156.67**	**519 156.67**	**529 950.65**	**551 640.35**	**574 893.07**	**554 568.96**	**541 748.90**	**491 119.58**	**–5.4**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation							–6 328.57	–6 710.22	
		Deforestation							388.24	389.95	
		Total (3.3)							**–5 940.33**	**–6 320.27**	
	Article 3.4[d]	Forest management							–51 120.26	–48 451.18	
		Cropland management	NA						NA	NA	NA
		Grazing land management	NA						NA	NA	NA
		Revegetation	NA						NA	NA	NA
		Total (3.4)	NA						**–51 120.26**	**–48 451.18**	NA

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] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in the national totals.

[c] 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.

[d] 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.

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.

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

	As reported	*Revised estimates*	*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	417 212 406			417 212 406	
CH_4	37 297 061			37 297 061	
N_2O	27 821 767			27 821 767	
HFCs	8 172 517			8 172 517	
PFCs	217 811			217 811	
SF_6	398 018			398 018	
Total Annex A sources	**491 119 579**			**491 119 579**	
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	–6 710 224			–6 710 224	
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	389 950			389 950	
Activities under Article 3, paragraph 4, for current inventory year[d]					
3.4 Forest management for current year of commitment period	–48 451 176			–48 451 176	
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 for base year					

Abbreviation: NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more 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 2011 annual inventory submission contains a complete set of common reporting format (CRF) tables for the period 1990–2009, submitted on 14 April 2011, and a national inventory report (NIR), submitted on 15 April 2011. Italy also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: KP-LULUCF activities, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Where necessary, the expert review team (ERT) also used previous years' submissions during the review. 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 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 and is complete in terms of years and geographical coverage, and generally complete in terms of source and sink categories and GHGs. The ERT notes that Italy has not estimated CH_4 emissions from untreated wastewater and recommends that the Party enhance the completeness of its reporting by including estimates of emissions from this category in the next annual submission (see para. 87 below).

10. The NIR 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 of the time series.

11. Italy has also provided the KP-LULUCF tables for 2008 and 2009, including information on activities under Article 3, paragraph 3, of the Kyoto Protocol and on forest management activity, which was selected by the Party under Article 3, paragraph 4, of the Kyoto Protocol. The ERT found some cases of possible overestimations of removals and/or underestimations of emissions from KP-LULUCF activities for the years pertaining to the first commitment period of the Kyoto Protocol (see paras. 70 and 96 below).

[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.

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

Overview

12. The ERT concluded that the national system continues to perform its required functions. The Party reported that the national system has not changed since the previous annual submission.

Inventory planning

13. The NIR describes the national system for the preparation of the inventory. The Institute for Environmental Protection and Research (ISPRA)[4] has overall responsibility for the national inventory with regard to the planning, preparation and management of the annual submission. ISPRA is also responsible for: the collection and processing of activity data (AD); all issues related to the selection of methodologies and the implementation of quality assurance/quality control (QA/QC) activities; the preparation of the annual plan for the national system; the performance of the inventory calculations; and the archiving and reporting of the inventory. The Italian Ministry for the Environment, Land and Sea is responsible for officially approving the annual submission.

14. The Ministry of Economic Development is responsible for the preparation of the national energy balance. Other agencies involved in the preparation of the inventory include the National Statistical System (Sistan – coordinated by the National Institute of Statistics (ISTAT)), the Ministry of Transportation and the Italian Civil Aviation Authority. ISPRA also closely cooperates with industrial associations to obtain data and assess the methodologies used in the inventory. The Italian Ministry for the Environment, Land and Sea is responsible for the national registry for forest carbon sinks. Finally, the waste sector is the responsibility of ISPRA.

Inventory preparation

Key categories

15. Italy has reported tier 1 and tier 2 analyses, both level and trend assessment, as part of its 2011 submission. The tier 1 key category analysis performed by the Party and that performed by the secretariat[5] 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). Italy used the key category analysis to prioritize plans for future improvements to the inventory.

[4] Istituto Superiore per la Protezione e la Ricerca Ambientale, in the original submission in Italian.

[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.

Uncertainties

16. Italy has provided a tier 1 uncertainty analysis, both for the level and for the trend, which is in accordance with the IPCC good practice guidance. The cumulative uncertainty of the total estimated GHG emissions (without LULUCF) for 2009 is 3.4 per cent and the trend uncertainty is 2.5 per cent, in accordance with tier 1. In addition, the Party has provided a tier 2 uncertainty analysis for a selected number of key categories for 2009. According to the NIR, the uncertainty values calculated under the tier 2 analysis for these categories are lower than those resulting from the application of the tier 1 analysis. Further, Italy has reported that the tier 2 uncertainty analysis will be extended to cover all inventory categories in the next annual submission. The ERT welcomes this development.

17. Italy indicates in the NIR that it uses the results of the uncertainty analysis, in conjunction with the key category assessment, to prioritize improvements to the GHG inventory.

Recalculations and time-series consistency

18. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that the recalculations reported by the Party for the period 1990–2008 have been undertaken to take into account: improvements in AD in the energy, industrial processes, solvent and other product use, LULUCF and waste sectors; improvements in the methodologies or EFs used in the energy, industrial processes, agriculture and waste sectors; and improvements to the parameters supporting the methodologies in the waste sector. The major changes, and the magnitude of the impact, include: an increase in estimated total GHG emissions excluding LULUCF in the base year (0.41 per cent) and an increase in 2008 (0.05 per cent), and an increase in total GHG emissions including LULUCF in the base year (1.1 per cent) and a decrease in emission levels in 2008 (1.2 per cent). The rationale for these recalculations is provided in the NIR and in CRF table 8(b). The ERT considers that the recalculations have improved the accuracy of the inventory.

Verification and quality assurance/quality control approaches

19. Italy has included a comprehensive description of its QA/QC activities in the NIR. In addition, the Party prepares an annual QA/QC plan which is available on the Internet.[6] The ERT found that the plan available on the Internet refers to the 2009 submission; however, following a request by the ERT during the review, Italy provided the ERT with the QA/QC plan for the 2011 submission. The ERT encourages Italy to update the QA/QC plan available on the Internet for current annual submissions. Category-specific QA/QC activities are also described under the respective chapters in the NIR.

20. The ERT notes with appreciation that the Party's QA/QC activities are implemented in an extensive, effective and multifunctional manner, in line with the UNFCCC reporting guidelines. QA/QC procedures have been specifically developed for the energy and industrial processes sectors, where plant-specific data and data collected under other international reporting obligations (e.g. the European Union (EU) large combustion plant directive, the European Union emissions trading scheme (EU ETS), the European Pollutant Release and Transfer Register (E-PRTR) and the United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution) are used for comparison purposes. The ERT also notes with appreciation that Italy is currently compiling a database containing data collected within the framework of various EU directives, and believes that there is an opportunity for this database to further advance the QA/QC activities carried out by the Party. The ERT commends Italy for the extensive use

[6] See <www.apat.gov.it/site/it_IT/APAT/Pubblicazioni/Altre_Pubblicazioni.html>.

of QA/QC procedures, in particular for the comparison of plant-specific data between different data sets and for the transparent documentation of the QA/QC activities.

Transparency

21. The ERT concludes that the CRF tables and the descriptions in the NIR are generally transparent and commends Italy for the comprehensive work it has performed in this regard. Nevertheless, the ERT found some room for further improvement across the sectors, mostly in relation to: the provision of additional information (e.g. the disaggregation of data for fugitive emissions and the provision of information on the composition of natural gas); the explanation of the trends (e.g. the trend of the solid fuel CO_2 implied emission factor (IEF) for iron and steel production, the difference between the CO_2 IEF for gasoline, gas oil and liquefied petroleum gas (LPG) before and after 1999 and the CO_2 IEF for cement production); and the provision of additional information on the establishment of methodologies or parameters (e.g. the determination of the N_2O emission factor (EF) for adipic acid production and the establishment of the CH_4 generation rate constant (k) parameter to estimate CH_4 emissions from solid waste disposal on land). Details of the recommended improvements can be found in the relevant sectoral chapters of this report.

Inventory management

22. 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, documentation on annual key categories and key category identification and planned inventory improvements. ISPRA is responsible for maintaining the archiving system.

3. Follow-up to previous reviews

23. Italy has carried out improvements to the 2011 inventory submission, in particular with regard to the completeness and transparency of the information reported in the NIR. For example, the verification and QA/QC procedures were explained in greater detail for all sectors, especially for those most affected by the recalculations. Improvements were also made to the inventory data, the most important being:

(a) In the energy sector: the recalculation of the CO_2 emissions from fuel consumption in iron and steel production due to the revision of the carbon balance; the update of the CO_2 EFs for steam coal and natural gas using data for the most recent years of the time series; the revision of data in the road transportation category due to the use of a new version of the model (COPERT IV) used to estimate emissions from road transportation, which has resulted in changes to the emissions of CH_4 and N_2O; the update of maritime traffic data; the inclusion of N_2O emissions from flaring in refineries for all years of the time series; and the reallocation of emissions within the petroleum refining subcategory for the entire time series using the EU ETS data;

(b) In the industrial processes sector: the recalculation of CO_2 emissions due to the availability of new information on the use of limestone and dolomite in the pulp and paper industries and from the treatment of flue gases in power plants; the update of the CO_2 EFs for adipic acid production based on data from the operator; the update of the AD for fluorinated gases (F-gases) and the consideration of new information on HFC-245fa; and the provision of a more detailed rationale for the estimation of PFC emissions from aluminium production in the relevant section of the NIR;

(c) In the agriculture sector: the update of the data for the estimation of emissions from rice cultivation; the collection of information on the amount of sewage sludge applied to agricultural soils; and the separate estimation of N_2O emissions from sewage sludge applied to soils from those in the waste sector;

(d) In the LULUCF sector: the recalculation of CO_2 emissions due to changes in the carbon stock change in living biomass (losses) and in the net carbon stock change in dead organic matter due to the update of land-use change areas; and the refinement of the smoothing process used to derive the land-use change matrices;

(e) In the waste sector: the revision of CH_4 emissions due to the inclusion of industrial waste disposed in municipal solid waste landfills; the update of the rapidly biodegradable fractions; the update of the amount of sludge, in order to take into account industrial waste; and the update of the information on waste composition.

24. Italy has provided detailed information in annex 12 to the NIR on how the recommendations from the previous review report have been addressed. The ERT commends Italy for the clear and transparent way it has presented this information.

4. Areas for further improvement

Identified by the Party

25. The 2011 NIR identifies several areas for improvement, including:

(a) The national institutions involved in the implementation of a national registry for forest carbon sinks, with the aim of identifying areas of land and land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1, will undertake actions to resolve the remaining problems in the LULUCF sector, in particular those related to the provision of information and the estimates of emissions and removals for the KP-LULUCF activities;

(b) A database compiling the information reported within the framework of the EU directives (see para. 20 above) will soon be complete;

(c) Italy will update the EFs for the estimation of N_2O emissions from agricultural soils;

(d) The Party will use the availability of new information on waste composition and other related parameters following the entry into force of the EU landfill directive;

(e) A comparison between local and national inventories is planned for the next annual submission;

(f) Italy will collect statistical data and information in order to implement a complete tier 2 uncertainty analysis.

Identified by the expert review team

26. During the review, the ERT identified some cross-cutting issues for improvement. These are listed in paragraph 119 below.

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

B. Energy

1. Sector overview

28. The energy sector is the main sector in the GHG inventory of Italy. In 2009, emissions from the energy sector amounted to 406,743.19 Gg CO_2 eq, or 82.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 2.8 per cent. The key driver for the decrease in emissions is the decrease in emissions from manufacturing industries and construction, which have decreased by 30,397.30 Gg CO_2 eq since the base year, or 34.5 per cent. Decreases in emissions were also observed in the categories energy industries (a decrease of 4,224.98 Gg CO_2 eq, or 3.1 per cent since the base year) and fugitive emissions (a decrease of 3,643.48 Gg CO_2 eq, or 33.8 per cent since the base year). The significant decreases in these categories were partly offset by increases in emissions from transport, which have increased by 16,361.18 Gg CO_2 eq, or 15.9 per cent since the base year, and from the category other sectors, which have increased by 10,302.91 Gg CO_2 eq, or 13.1 per cent since the base year. Within the sector, 32.7 per cent of the emissions were from energy industries, followed by 29.3 per cent from transport, 21.8 per cent from other sectors and 14.2 per cent from manufacturing industries and construction. Fugitive emissions from fuels accounted for 1.8 per cent and other (non-specified) accounted for 0.2 per cent.

29. Italy has made recalculations for the energy sector between the 2010 and 2011 submissions, including some in response to the 2010 annual review report. The impact of these recalculations on the energy sector is a decrease in emissions of 0.5 per cent for 2008. The main recalculations took place in the following categories:

(a) Manufacturing industries and construction: the update of the CO_2 EFs for coal and natural gas based on detailed EU ETS data available for the years 2005–2008 for coal and 2008 for natural gas; and the elimination of double counting associated with the carbon stored in steel produced;

(b) Road transportation: the update to the latest version of the COPERT IV software (version 8.0) resulting in minor changes to CH_4 and N_2O emission estimates for the complete time series.

30. The ERT notes with appreciation that Italy has improved the transparency and comparability of the reporting of fugitive emissions by disaggregating the estimates into the following subcategories: venting and flaring emissions from oil production; gas flaring from natural gas production; and refinery gas flaring from oil flaring. The ERT commends the Party for the improvements made and encourages Italy to continue its efforts to further disaggregate the fugitive emission subcategories whenever the availability of higher-tier data allows (e.g. emissions from the exploration of natural gas, leakages in industrial and power stations and commercial and domestic uses, and emissions from venting).

31. CO_2 emissions from natural gas transmission and distribution have been reported for the first time in the 2011 submission and the ERT commends Italy for this improvement. During the review, the ERT requested that Italy provide information on the CH_4 and CO_2 composition of the natural gas in the pipelines in order to better understand the calculation of the leakage emissions from this category. In response to this request, the Party provided the ERT with detailed information on the natural gas composition from several possible import origins of the gas, as well as the national averages. The ERT recommends that Italy include in the NIR, as a minimum, the information on the national average composition of natural gas in order to improve the transparency of its reporting.

2. Reference and sectoral approaches

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

32. For 2009, the CO_2 emission estimates according to the reference approach were 0.29 per cent higher than those calculated according to the sectoral approach. Explanations for differences are provided in the documentation box of CRF table 1.A(c) and in annex 4 to the NIR.

33. The apparent consumption data reported by Italy in the annual inventory correspond closely to those reported to the International Energy Agency (IEA), with differences within a 5 per cent range for all years of the time series. A systematic bias is observed, and the values of the IEA data are lower than the CRF data for all years of the time series. Similarly, there is a difference in the trend and in the growth rate across the entire time series (1990–2009) for total apparent consumption; it is 4 per cent according to the reference approach, whereas it is 5 per cent in accordance with the IEA data. The ERT recommends that Italy explain these differences in values and in the trend in its next annual submission.

34. The ERT also identified other differences between both data sets: for example, between 1990 and 2009 crude oil production is 20–40 per cent higher in the inventory than in the IEA data. During the review, Italy explained to the ERT that the data on crude oil production are higher in the inventory because the refinery feedstock production is added to the crude oil production (Italy subtracts the same amount in the refinery feedstock stock change data), with the aim of balancing the primary and secondary liquid fuel production in the national energy balance. The ERT recommends that Italy include this information in its explanation of any differences between the inventory data and the IEA data in the NIR of its next annual submission.

International bunker fuels

35. Fuel consumption for international aviation, as reported in CRF table 1.C, is 5 per cent lower than the data reported to IEA for the period 1991–2002, but generally corresponds closely in the period from 2003 onwards.

36. With regard to international marine bunkers, the figures reported to IEA are approximately double those reported in the inventory until 1998. This discrepancy is partly due to a different split between international and domestic navigation for both residual fuel oil and gas/diesel oil. The previous review report[7] noted that small discrepancies occur between CRF tables 1.C and 1.A(b) for residual fuel oil (international marine bunkers) for all years of the time series. Although Italy reported in the NIR that these problems had been resolved, the ERT observed that a difference still exists in the current submission. Therefore, the ERT reiterates the recommendation that Italy resolves or explain the difference in the figures and improve its QA/QC system in order to help prevent such issues from reoccurring.

Feedstocks and non-energy use of fuels

37. Italy has presented detailed information in the NIR on how it manages the fuels that are used for non-energy use and as feedstocks. The Party bases its inventory of feedstocks on a survey prepared by the Ministry of Economic Development covering petrochemical plants, which is more detailed than the energy balance. The quantity stored for each product is calculated comparing the inputs and outputs for petrochemical plants. The ERT welcomes the detailed presentation of the methodology by the Party, but recommends that

[7] FCCC/ARR/2010/ITA, paragraph 36.

it report in CRF table 1.A(d) the fractions stored in a consistent manner with the information reported in the NIR (in the CRF table, the reported fraction stored is 1.00 for all fuels) or provide explanations in the NIR and documentation boxes in the CRF tables for the differences in reporting between the NIR and CRF.

3. Key categories

Stationary combustion: liquid and solid fuels – CO_2

38. The ERT noted that the CO_2 IEF for consumption of liquid fuels in petroleum refining has increased during the period 1990–2007 by 19.5 per cent, from 66.21 t/TJ to 79.11 t/TJ, but has decreased by 1.2 per cent between 2007 and 2008 (78.13 t/TJ), and by 2.1 per cent between 2008 and 2009 (76.51 t/TJ). In response to a question raised by the ERT during the review, Italy explained that the trend in the IEF is driven by the mix of the fuels used, which, in this industrial category, is composed mainly of refinery gas, fuel oil and petroleum coke. These fuels have very different EFs, and the relative amount used of each fuel varies from year to year. The ERT recommends that Italy include this explanation in the NIR of its next annual submission, together with a description of the drivers behind this trend in order to improve the transparency of its reporting.

39. The ERT noted that the CO_2 emissions from iron and steel production show a decreasing trend in the CO_2 IEF for solid fuels: the 2009 IEF (57.47 t/TJ) is 20.3 per cent lower than the 1990 value (72.13 t/TJ). Italy explained to the ERT during the review that the AD and emissions reported under the category solid iron and steel are the result of a wider carbon balance of coal. The ERT notes, however, that although the iron and steel production category is based on a carbon balance, which is in accordance with the IPCC good practice guidance, there is still a need to explain the variations in the IEFs, at least as part of the QA/QC process. Therefore, the ERT recommends that Italy provide explanations for the observed trend in the solid fuel CO_2 IEF in iron and steel in the next annual submission.

Road transportation: liquid fuels – CO_2

40. The CO_2 EFs for gasoline, gas oil and LPG are based on country-specific studies carried out for the period 2000–2009, while for the period 1990–1999, Italy uses IPCC defaults from the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). Although the differences are small (the IEF for gasoline changes from 71.03 t/TJ to 71.15 t/TJ, for diesel oil from 73.24 t/TJ to 73.15 t/TJ and for LPG from 64.35 t/TJ to 64.34 t/TJ), the ERT considers that the reporting is not transparent and that time-series consistency is not clearly ensured. During the review, the ERT requested that Italy explain why it has not recalculated the time series back to 1990 using the country-specific EFs in order to maintain time-series consistency. Italy informed the ERT that a study had been carried out to evaluate the appropriateness of the use of the default EFs contained in the Revised 1996 IPCC Guidelines for the period 1990–1999, and the study concluded that these EFs were representative of the diesel oil and LPG used in Italy during that period. For gasoline, a country-specific EF has been calculated taking into account the IPCC default EF and the specific energy content of the national fuel. In addition, since 2000, a number of EU directives regulating the fuel quality in EU member States have been implemented in Italy,[8] resulting in changes in the characteristics of the fuels. These changes affect the content of carbon, hydrogen and oxygenates in the fuels, which in turn influence the CO_2 EFs. Therefore, the EFs since 2000 are specifically representative of the latter period of the time series and cannot be applied to the earlier part of the time series. The ERT recommends that

[8] EU directives 93/12/EC, 98/70/EC, 2003/17/EC and 2009/30/EC.

Italy include this explanation in the NIR of its next annual submission in order to improve the transparency of its reporting.

41. Italy also informed the ERT that a specific survey was conducted during the period 2000–2001 to characterize the fuel used in the country and a similar survey is planned for 2012. The ERT encourages the Party to carry out this survey and implement the results in future annual submissions, taking into consideration the need to ensure time-series consistency. The ERT further recommends that Italy report on the outcome of the survey in the NIR.

Oil and natural gas: liquid fuels – CH_4

42. Italy has reported fugitive CH_4 emissions from the transportation of oil (category 1.B.2(a)(iii)) in CRF table 1.B.2 as not applicable ("NA"). During the review, the ERT requested that the Party justify the use of this notation key and how it relates to the characteristics of Italy's oil import and export transportation systems. Italy informed the ERT that the use of the notation key "NA" was an error and that the notation key included elsewhere ("IE") should be used instead to indicate that the emissions have been reported under the subcategory refining/storage of oil (CRF table 1.B.2(a)(iv)). The Party also explained that these emissions were estimated using an emission loss balance approach. The ERT recommends that Italy, in its next annual submission, use the correct notation key and provide a description in the NIR clarifying how the subcategory refining/storage includes emissions from oil transportation.

4. Non-key categories

Navigation: gasoline – CH_4

43. The ERT noted that the gasoline CH_4 EF decreased from 116.69 t/TJ to 110.74 t/TJ during the period 1997–2000, while for the years outside of this period the EF is steady, thereby leading to an apparent lack of time-series consistency. Responding to a request for clarification from the ERT, Italy informed the ERT that the difference in the value of the EF was due to the change from two-stroke to four-stroke engines in the national fleet of recreational craft gasoline boats, driven by the introduction of new models into the market. In 2000, the fleet comprised 90 per cent two-stroke engines and 10 per cent four-stroke engines. The ERT considers that, although the explanation seems plausible, it is unusual for the change to stop abruptly in 2000, and encourages Italy to consider updating the composition of the recreational craft gasoline national fleet, taking into account equipment changes since 2000, and to use this as a basis to update the CH_4 EF.

C. Industrial processes and solvent and other product use

1. Sector overview

44. In 2009, emissions from the industrial processes sector amounted to 29,939.54 Gg CO_2 eq, or 6.1 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 1,861.59 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 20.5 per cent in the industrial processes sector, and decreased by 24.2 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector were the decrease in emissions from chemical industry, by 7,668.46 Gg CO_2 eq, or 76.8 per cent since the base year, metal production, by 4,113.28 Gg CO_2 eq, or 73.3 per cent since the base year and mineral products, which have decreased by 3,767.09 Gg CO_2 eq, or 17.7 per cent since the base year. The decrease in emissions from chemical industry is mainly due to the abatement systems installed in nitric acid and adipic acid production plants. The decrease in

emissions from these categories was partly offset by the increase in emissions from consumption of halocarbons and SF_6, which have increased by 8,631.95 Gg CO_2 eq, or 40 times since the base year. Within the industrial processes sector, 58.4 per cent of the emissions were from mineral products, followed by 28.8 per cent from consumption of halocarbons and SF_6, 7.7 per cent from chemical industry and 5.0 per cent from metal production. HFC emissions reported under the category other (magnesium foundries) represent 0.01 per cent of total emissions from the industrial processes sector, and emissions from production of halocarbons and SF_6 are reported as "NA" for the production of hydrochlorofluorocarbon-22.

45. Italy has made recalculations for the industrial processes sector between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and EFs, and in order to rectify identified errors. The main recalculations took place in the following categories:

(a) Mineral products: the recalculation resulted in an increase in CO_2 emissions of 0.01 per cent for 2008, mainly due to the increase in limestone and dolomite use throughout the time series;

(b) Metal production:

(i) The recalculation resulted in an increase in CH_4 emissions from iron and steel production equal to 0.62 per cent for 2008;

(ii) The recalculation of F-gas emissions resulted in a decrease in PFC emissions of 0.35 per cent for aluminium production and an increase in CO_2 emissions of 0.02 per cent for 2008;

(iii) The recalculations of ferroalloys resulted in a decrease in CO_2 emissions of 55.4 per cent for 2008.

46. The reporting on the industrial processes sector in Italy's inventory is complete. Information on the methodological approaches, data availability and relevant supportive documentation has, in general, been transparently presented in the NIR. The ERT welcomes the addition of information on the data and methods used to estimate emissions from the pulp and paper industry in response to the recommendations from the 2009 review report,[9] and encourages the Party to continue enhancing the information in its next annual submission. Detailed recommendations are provided in the category-specific paragraphs below.

47. Italy has used a tier 1 approach to estimate uncertainties for the industrial processes sector, and applied general QA/QC procedures in compiling the inventory for this sector. The ERT notes that Italy has used data from the EU ETS and E-PRTR in some categories of its inventory, which sometimes leads to a lower IEF for the most recent years of the time series (e.g. for cement, lime, ammonia, and iron and steel production), which could be inconsistent with the value of the IEF in previous years. In response to a question raised by the ERT during the review, Italy confirmed that in cases where it uses such data, both the AD and the EF are verified and certified in accordance with the rules set by the EU ETS directive, thereby ensuring a high level of accuracy in the inventory. The ERT welcomes the use of these data, and recommends that Italy provide, in its next annual submission, more information about the methodology used to verify and certify the EU ETS data, make sure that they are in line with the IPCC good practice guidance and make efforts to obtain a consistent time series for the whole period.

[9] FCCC/ARR/2009/ITA, paragraph 60.

2. Key categories

Cement production – CO_2

48. Cement production is the main source of CO_2 emissions in the industrial processes sector, and represents 2.7 per cent of total GHG emissions in 2009. Italy has used a tier 2 approach to estimate CO_2 emissions from this category using AD on clinker production provided by ISTAT. The EFs were estimated on the basis of information provided by the Italian Cement Association (AITEC) and by cement facilities under the framework of E-PRTR and the EU ETS. The ERT welcomes the high level of accuracy of the inventory and the use of extensive sources of information.

49. The ERT noted that the IEF for cement production was 0.540 t CO_2/t clinker in the period 1990–2003, calculated on the basis of the average calcium oxide content in clinker and taking into account the contribution of carbonates and additives used in its production. Thereafter, the IEF decreases and is 0.518 t CO_2/t clinker in 2008 and 0.532 t CO_2/t clinker in 2009. In response to a question raised by the ERT during the review on the reasons for the trend of the CO_2 IEF, and also to the request that the Party provide the results of the QC procedures that has been conducted for this industry type, Italy informed the ERT that, due to a lack of plant-specific data, AITEC had supplied an average value of 0.540 kg CO_2/t clinker resulting from the application of the World Business Council for Sustainable Development Guidelines, while from 2004 onwards, Italy had estimated emissions from cement production based on data from E-PRTR and the EU ETS. The ERT recommends that Italy provide, in its next annual submission, more transparent information on the verification of these data, make sure that they are in line with the IPCC good practice guidance and make efforts to improve the consistency of the entire time series (1990–2009).

Adipic acid production – N_2O

50. The ERT notes that the installation of abatement technology in adipic acid production has resulted in a decrease in the value of the EF throughout the time series, starting from the IPCC default EF in 1990 (0.30 kg N_2O/kg adipic acid produced) to 0.28 kg N_2O/kg adipic acid produced in 2004 (an 8.3 per cent decrease) and down to 0.03 kg N_2O/kg adipic acid produced in 2009 (an 89.7 per cent decrease since the base year). In response to a question raised by the ERT during the review, Italy provided further information about the abatement technology installed in this category, the N_2O catalytic decomposition abatement technology and the reason for the decrease in emissions since 2004, including the test and installation of the abatement technology and gradual increase in its efficiency until the final expected level of 95 per cent. The ERT recommends that Italy include the information provided to the ERT in the NIR of its next annual submission, in order to improve transparency.

51. The NIR contains a detailed description of the methodology used to estimate the EF for this category in more recent years, which basically uses a formula developed by the industrial operator to estimate the N_2O released from the process, but no details are provided on its origin. The ERT recommends that Italy provide more detailed information, in its next annual submission, on the formula used to estimate the EF for this category and on how it was derived.

3. Non-key categories

Limestone and dolomite use – CO_2

52. In response to recommendations in the previous review report,[10] the CO_2 emissions from the treatment of flue gases and from paper production were accounted for across the whole time series in order to ensure consistency. The impact of the recalculations was a 6.6 per cent increase in the emission estimate for this category for 2008. The ERT welcomes the efforts made by Italy that have resulted in increased completeness of the coverage of the emission estimate for this category and improved time-series consistency. The ERT also encourages Italy to continue the implementation of its improvement plans for this category.

Aluminium production – CO_2 and PFCs

53. Italy reported that CO_2 emissions from this category have been estimated on the basis of AD provided by the associations Enirisorce and the ASSOMET.[11] Italy uses an EF equal to 1.55 t CO_2/t primary aluminium production for the period 1990–2001 due to the unavailability of data. From 2002 onwards, the CO_2 emissions have been calculated by the operator according to the criteria defined by the International Aluminium Institute (IAI) and are provided for three components: electrolysis emissions from prebake anode; pitch volatile matter oxidation from pitch coking; and bake furnace packing material. In the 2011 submission, the CO_2 emissions from primary aluminium production have been updated from 2000 onwards using AD derived from the EU ETS, and the recalculation has resulted in an increase in the EF to 2.08 t CO_2/t primary aluminium production (a 34.2 per cent increase since the base year). The ERT recommends that Italy provide, in the NIR of its next annual submission, improved information clarifying the methodological approaches used, in accordance with the IPCC good practice guidance.

54. Italy has recalculated its estimates of PFC emissions from primary aluminium production due to the provision of certificated emissions from an aluminium producer (ALCOA) for 2005 onwards, resulting in updated slope coefficient data from 2000 and a decrease in the PFC IEFs: the hexafluoroethane (C_2F_6) IEF decreased by 92.3 per cent between 1990 (0.180 kg C_2F_6/t aluminium) and 2009 (0.014 kg C_2F_6/t aluminium), and the tetrafluoromethane (CF_4) IEF decreased by 92.3 per cent between 1990 (0.856 kg CF_4/t aluminium) and 2009 (0.115 kg CF_4/t aluminium). During the review, Italy provided the ERT with additional information on the comparison between the IPCC default EFs and the EFs used for the estimation of emissions from this category, and informed the ERT that, in the follow-up to a recommendation made by the previous ERT,[12] several comparisons have been carried out, using a tier 1 methodology for the period 1990–1999 and a tier 2 methodology from 2000 onwards. In particular, a comparison was made between the following sources of EFs:

(a) A 2003 IAI document, supplied by ALCOA to calculate the emissions from 1990 to 1999;

(b) The updated 2006 IAI document, which matches the default EFs contained in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines);

(c) The default EFs contained in the IPCC good practice guidance.

[10] FCCC/ARR/2010/ITA, paragraph 47.
[11] ASSOMET is the Associazione Nazionale Industrie Metalli non Ferrosi.
[12] FCCC/ARR/2010/ITA, paragraph 46.

55. The EFs from IAI were chosen to estimate emissions during the period 1990–1999 since they were the only EFs referring to the point fed prebake technology, which was the technology in place at the two plants during that period. Therefore, the PFC emissions from aluminium production were estimated using a tier 1 approach for the period 1990–1999 and a tier 2 approach from 2000 onwards. The Party explained in the NIR that the use of a tier 2 methodology to estimate emissions for the whole time series is not possible since the historical operating data (for the period 1990–1999) are not available as during that period the plants were managed by a different company that no longer exists. The ERT welcomes the explanations by the Party in the NIR.

Substitutes for ozone-depleting substances: SF_6

56. Italy has estimated SF_6 emissions from electrical equipment using the IPCC tier 2a approach from 1990 to 1994, and the IPCC tier 3c (country-level mass-balance) approach from 1995 onwards for both medium- and high-voltage electrical equipment, while an IPCC tier 3b approach has been applied for the emissions from the energy production plant during services. The ERT recommends that Italy enhance the transparency of its reporting by explaining the reasons for the changes in the methodology used throughout the time series in its next annual submission.

D. Agriculture

1. Sector overview

57. In 2009, emissions from the agriculture sector amounted to 34,481.12 Gg CO_2 eq, or 7.0 per cent of total GHG emissions. Since the base year, emissions have decreased by 15.1 per cent. The key driver for the fall in emissions is the decline in the populations of dairy and non-dairy cattle, sheep and goats, and in the amount of nitrogen (N) synthetic fertilizer applied to soils. Since the base year, emissions from agricultural soils have decreased by 4,022.49 Gg CO_2 eq, or 20.6 per cent, emissions from enteric fermentation have decreased by 1,399.32 Gg CO_2 eq, or 11.5 per cent, and emissions from manure management have decreased by 735.62 Gg CO_2 eq, or 10.0 per cent. Within the sector, 44.8 per cent of the emissions were from agricultural soils, followed by 31.3 per cent from enteric fermentation, 19.3 per cent from manure management and 4.6 per cent from rice cultivation. The remaining 0.05 per cent were from field burning of agricultural residues. Emissions from prescribed burning of savannas are reported as not occurring ("NO").

58. The Party has made recalculations for the agriculture sector between the 2010 and 2011 submissions in response to the 2010 annual review report and following changes in AD. The impact of these recalculations on the agriculture sector is an increase in emissions of 0.2 per cent for 2008. The main recalculations took place in the following categories:

(a) Rice cultivation;

(b) Agricultural soils;

(c) Field burning of agricultural residues.

59. The ERT concludes that the inventory for the agriculture sector is of high quality. The inventory is complete with respect to the coverage of categories, gases and years, is transparent and accurate, and is in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Uncertainties, recalculations, QA/QC procedures and planned improvements are described in the NIR at the appropriate category level. The estimates are consistent across the time series, and the sources of AD and EFs, methodological issues and explanations of emission trends of AD and EFs are transparently explained in the NIR.

60. The ERT found some inconsistencies within the NIR and between the NIR and the CRF tables on the reporting of the methodological levels used. For example: in table 1.3 of the NIR the notation key tier 1 ("T1") was used; in the agricultural soils section of the NIR, the use of tier 1 methods was reported for the categories synthetic fertilizers, animal manure applied to soils, cultivation of histosols, and for N from sewage sludge, while for N-fixing crops and crop residues, country-specific methods were used in accordance with the IPCC approach; and in CRF summary table 3, the notation keys default ("D") and "T1" were used. The Party informed the ERT during the review that, with regard to CRF summary table 3, the notation key "D" will be replaced by the notation key country-specific ("CS"). The ERT recommends that the Party resolve these issues in the next annual submission.

2. Key categories

Enteric fermentation – CH_4

61. Italy uses both tier 1 and tier 2 methods from the IPCC good practice guidance for the estimation of emissions from enteric fermentation: a tier 2 method and country-specific EFs are used to estimate emissions from dairy cattle, non-dairy cattle, buffalo and rabbits, while a tier 1 method and default EFs are used to estimate emissions from the remaining livestock types. The AD are provided by the Italian National Institute for Statistics through the National Statistical System. The ERT concludes that the approach implemented by the Party is in line with the IPCC good practice guidance.

Manure management – CH_4

62. Italy uses both tier 1 and tier 2 methods from the IPCC good practice guidance for the estimation of emissions from manure management: a tier 2 method and country-specific EFs are used to estimate emissions from dairy cattle, non-dairy cattle, buffalo and swine, while a tier 1 method and default EFs are used to estimate emissions from the remaining livestock types. The ERT concludes that the approach implemented by the Party is in line with the IPCC good practice guidance.

63. However, the ERT found some inconsistencies between the values of the EFs reported in the NIR and in CRF table 4.B(a) for sheep, goats, horses, mules and asses, poultry and rabbits, and the IPCC default values for the cool climate region, as contained in the Revised 1996 IPCC Guidelines, which Italy states it is using in the NIR (the Party states, on page 152 of the NIR, that, "since the yearly average temperature in Italy is 13 °C, EFs are characteristic of the 'cold' climatic region"). In response to a question raised by the ERT during the review, Italy clarified that it has actually calculated the EFs based on IPCC default values and taking into account the fact that the animal manure also occurs in provinces classified as temperate climate regions. The ERT recommends that Italy include, in the NIR of its next annual submission, the explanations provided to the ERT during the review, together with information on the share of populations for each climate region for the above-mentioned species.

Manure management – N_2O

64. Italy uses the default method from the IPCC good practice guidance together with country-specific AD and EFs to estimate N_2O emissions from livestock manure management. The ERT concludes that the approach used by the Party is in line with the IPCC good practice guidance.

Agricultural soils – N_2O

65. Italy uses both tier 1 and country-specific methods in accordance with the IPCC good practice guidance to estimate direct and indirect N_2O emissions from agricultural

soils: country-specific AD and default EFs are mainly used. The ERT concludes that the approach implemented by the Party is in line with the IPCC good practice guidance.

66. The ERT commends Italy for having incorporated in the inventory for the agriculture sector direct and indirect N_2O emission estimates for the use of sewage sludge on agricultural soils, thereby increasing the completeness of the inventory.

E. Land use, land-use change and forestry

1. Sector overview

67. In 2009, net removals from the LULUCF sector amounted to 94,670.97 Gg CO_2 eq. Since the base year (net removals of 61,795.08 Gg CO_2 eq), net removals have increased by 53.2 per cent. The key driver for the rise in removals is the increase in CO_2 removals from forest land remaining forest land and from grassland. Net removals from forest land remaining forest land have increased by 24,829.58 Gg CO_2 eq, or 59.8 per cent since the base year, and net removals from grassland have increased by 15,563.92 Gg CO_2 eq, or 393.6 per cent since the base year. In the same period, net removals from cropland have decreased by 6,528.14 Gg CO_2 eq, or 34.7 per cent from removals of 18,827.55 Gg CO_2 eq in the base year, and emissions from settlements have increased by 989.46 Gg CO_2 eq, or 39.2 per cent since 1990. Within the sector,net removals of 66,369.35 Gg CO_2 eq were from forest land, followed by 19,518.02 Gg CO_2 eq from grassland, 12,299.41 Gg CO_2 eq from cropland, and net emissions of 3,515.81 Gg CO_2 eq were from settlements. Emissions and removals from wetlands and other land were reported as "NO", and emissions and removals from settlements remaining settlements were reported as not estimated ("NE").

68. The Party has made recalculations for the LULUCF sector between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on the LULUCF sector is an increase in removals of 6.3 per cent for 2008. The main recalculations took place in the following categories:

(a) Land converted to grassland;

(b) Forest land remaining forest land.

69. Land-use change matrices for every year in the period 1990–2009 have been prepared based on national land-use statistics for forest land, cropland, grassland, wetlands and settlement areas. The annual figures for land-use change areas consider, in the first place, the growth of forest land, using data from the national forestry inventory, and a set of hierarchy rules on land-use change that were derived from assumptions based on expert judgement. These reflect, in practice, known patterns of land-use change in the country as well as the need to keep the total national land area constant. During the review, the Party provided the ERT with a detailed description of the rationale for these rules and assumptions, which can be summarized as follows: new forest land areas can only result from former grassland areas; new settlement areas can only result from the conversion of forest land or cropland areas; new cropland areas can only result from the conversion of grassland areas; and new grassland areas can only result from cropland areas. Italy also explained to the ERT that activities planned under the framework of the national registry for forest carbon sinks could be useful to detect land uses and land-use changes between 1990 and 2012. Some of the activities under that framework, in particular the development of the national land-use inventory (IUTI), have been already completed, and a process of validation and verification of the IUTI data is under way. The ERT commends Italy for the on-going developments and recommends that the Party apply the forthcoming data as soon as possible, in order to improve the accuracy of the inventory for the LULUCF sector, as soon as possible.

70. In Italy, plantations are classified as part of cropland, although they contain species usually found in forests. In response to a question raised by the ERT during the review with regard to this issue, the Party referred to the NIR, where it is explained that plantations in Italy have economic values other than forestry purposes, and that this definition is consistent with the definition of forest land according to the Food and Agriculture Organization of the United Nations (FAO). However, the ERT notes that, based on the terms and definitions from the Global Forest Resources Assessment (FRA) 2005, forests include "plantations primarily used for forestry or protection purposes, such as rubber-wood plantations and cork oak stands", and exclude "tree stands in agricultural production systems, for example in fruit plantations and agro-forestry systems". In addition, forest areas reported in the NIR and CRF tables are systematically different from those reported to FAO (FRA, 2000). Therefore, the ERT considers that the decision to include plantations under cropland has not been clearly explained in the NIR and recommends that the Party include a more detailed justification for this choice and of the difference between data reported to FAO and the GHG annual inventory, in its next annual submission.

71. Italy assumes that the carbon stock changes in mineral soils for the land-use conversion categories occur fully in the year after the conversion takes place. The ERT notes that the IPCC good practice guidance for LULUCF allows the use of country-specific land-use transition periods,[13] provided that removals are not overestimated and emissions are not underestimated. Italy provided information to the ERT during the review showing that the soil carbon changes rapidly after the land-use conversion, but the ERT still considers that that does not mean that the soil carbon reaches a new equilibrium in one year. In response to the list of potential problems further questions raised by the ERT at the end of the review week, Italy informed the ERT that it will use a 20-year transition period for land-use changes in the next annual submission (except for forest land converted to settlements and deforestation, where a one-year transition period will still be used) and provided estimates of the implications of this revised transition period for 2009: soil carbon stock changes of 1,991 Gg C for land-use conversion using a 20-year transition period compared to 4,335 Gg C as reported in the 2011 submission. The ERT recommends that the Party, in its next annual submission, recalculate its estimates using a transition period of 20 years.

72. Italy estimates the carbon stock changes in mineral soils using linear relationships with above-ground biomass. The ERT considers that the linear relationships developed by the Party, which have a low square correlation (<0.1) and high uncertainties. The ERT also notes that the carbon stock changes in mineral soils in several land-use categories are close to or larger than the carbon stock changes in living biomass, which is uncommon.

73. Responding to the ERT at the end of the review, Italy explained that it had been demonstrated that mineral soils in forest land remaining forest land are not a net source of emissions and that a zero carbon stock change in mineral soils can be assumed in accordance with the tier 1 method from the IPCC good practice guidance for LULUCF. With regard to land-use changes, Italy explained to the ERT that it was not possible to use the IPCC default value for the reference soil organic carbon content or to develop country-specific reference values for the different land-use categories. The ERT disagrees with the Party and considers that existing soil data would allow Italy to develop a combined reference soil carbon content for different land uses. The ERT strongly recommends that the Party develop such reference soil carbon content and estimate the carbon stock changes in mineral soils for major land-use conversion using a combination of tier 1 and 2 methods from the IPCC good practice guidance for LULUCF in its next annual submission.

[13] The transition period represents the length of the period taken to change from one equilibrium state of "X" land use to a new equilibrium state of "Y" land use.

74. The NIR includes quantitative uncertainty estimates for AD and EFs and for the reported carbon pools and land-use categories using a tier 1 approach from the 2006 IPCC Guidelines. For all categories, Italy has reported category-specific QA/QC procedures as well as verification actions. However, the ERT found some errors in the NIR (e.g. the formula used to estimate the below-ground biomass of trees is incorrect; the annual area of land converted to forest land reported in CRF table 5.A (78.48 kha for 2009) is incorrect). The ERT also notes that the notation key used to report wetlands should be "NE" rather than "NO". Therefore, The ERT recommends that the Party correct the identified errors and improve the implementation of QA/QC procedures in its next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

75. In 2009, forest land remaining forest land was a net sink of 65,040.14 Gg CO_2, and net removals have increased by 59.0 per cent since 1990. Italy has estimated the changes in carbon stock in all carbon pools. However, the ERT notes that the CO_2 removals in mineral soils amount to 41.0 per cent of total removals for this category, which is uncommon among reporting Parties, and which is also unusual considering that changes in this pool are assumed to be zero in accordance with the IPCC tier 1 method. The ERT recommends that Italy apply an IPCC tier 1 method or develop an alternative robust method for the estimation of carbon stock changes in mineral soils in its next annual submission (see para. 71 above).

Cropland remaining cropland – CO_2

76. In 2009, cropland remaining cropland was a net sink of 12,299.41 Gg CO_2 eq, and has decreased by 35.1 per cent since 1990 (18,948.73 Gg CO_2 eq), mainly due to a decrease in cropland area (17.6 per cent in the same period).

77. CO_2 emissions and removals from plantations and perennial wood crop are included in this category (see para. 70 above). The ERT notes that the carbon stock changes in mineral soils in plantations were about 67.6 per cent of those in living biomass, which is considered unusual among reporting Parties, in particular since the IPCC tier 1 method assumes these differences to be zero. The ERT recommends that Italy apply the IPCC tier 1 method or develop alternative robust methods and parameters to estimate the carbon stock changes in mineral soils under cropland remaining cropland in its next annual submission.

Grassland remaining grassland – CO_2

78. Grassland remaining grassland was a net sink of 6,729.89 Gg CO_2 eq in 2009, and has increased by 70.2 per cent since 1990 (3,954.11 Gg CO_2 eq), mainly due to an increase in the area of other wooded land. The ERT notes that the carbon stock changes in mineral soils in other wooded land in 2009 are 2.7 times those in living biomass, while the IPCC tier 1 method assumes these carbon stock changes to be zero. The ERT recommends that Italy apply the IPCC tier 1 method or develop alternative robust methods and parameters to estimate the carbon stock changes in mineral soils for this category, and in particular for wooded land, in its next annual submission.

Land converted to grassland – CO_2

79. This land-use change category is reported as a net sink of 12,788.14 Gg CO_2 in 2009, and the majority of net removals result from the carbon stock changes in mineral soils under cropland converted to grassland (e.g. emissions from mineral soils in 2009 were 4,045.52 Gg C and removals in living biomass were 557.84 Gg), which results from the assumption that soil organic levels are attained within just one year after the land-use

change. Given that the total area under this land-use category has been increasing since 1990, the ERT considers that the application of a transition period of one year could overestimate the CO_2 removals from mineral soils in this category, when compared to the IPCC default transition period of 20 years. In response to the list of potential questions and further questions raised by the ERT during the review, Italy agreed to use a 20-year transition period in the next annual submission and provided the ERT with preliminary results using the revised transition period. The ERT commends the Party's plans to use the 20-year transition period for the estimation of carbon stock changes in mineral soils in its next annual submission. The ERT also recommends that Italy develop a reference soil carbon content of cropland and grassland and estimate the carbon stock changes in mineral soils for land-use conversion using tier 1 and 2 methods from the IPCC good practice guidance for LULUCF in its next annual submission (see para. 71 above).

3. Non-key categories

Land converted to forest land – CO_2

80. CO_2 emissions and removals from grassland converted to forest land were reported with figures while other land uses converted to forest land were reported as "NO". The ERT notes that the carbon stock changes in mineral soils in 2009 were 3.7 times those in living biomass, which is unusual among reporting Parties. The carbon stock changes reported in living biomass in CRF table 5.A were estimated using an annual conversion period of one year, which is not in accordance with the IPCC good practice guidance for LULUCF (see para. 71 above). The ERT recommends that Italy use a transition period of 20 years, develop a reference soil carbon content for grassland and forest land and estimate the carbon stock changes in mineral soils for grassland converted to forest land using tier 1 and 2 methods from the IPCC good practice guidance for LULUCF.

F. Waste

1. Sector overview

81. In 2009, emissions from the waste sector amounted to 18,094.14 Gg CO_2 eq, or 3.7 per cent of total GHG emissions. Since the base year, emissions have decreased by 8.9 per cent. The key driver for the fall in emissions is the decrease in emissions from solid waste disposal on land, which have decreased by 2,512.56 Gg CO_2 eq, or 16.5 per cent since the base year. In the same period, emissions from wastewater handling have increased by 865.64 Gg CO_2 eq, or 22.6 per cent since the base year. Within the sector, 70.4 per cent of the emissions were from solid waste disposal on land, followed by 25.9 per cent from wastewater handling and 3.7 per cent from waste incineration. The remaining 0.02 per cent were CH_4 emissions from composting (reported under the category other (waste)).

82. Recalculations have been performed and reported in the waste sector between the 2010 and 2011 submissions, including for solid waste disposal on land, wastewater handling and incineration, mostly as a result of updates to AD. These recalculations resulted in an increase in emissions from the waste sector of 10.7 and 12.6 per cent in the base year and 2008, respectively.

83. Italy explains in the NIR that QA/QC procedures have been performed for the waste sector, but no information was provided on the results of their implementation in the NIR. During the review, the Party provided the missing information, which showed that it had applied QC tier 1 procedures to the emission estimates, AD and related parameters for all categories. The ERT encourages Italy to use tier 2 QC procedures for solid waste disposal on land and wastewater handling in the next annual submission, since these are key categories.

2. Key categories

Solid waste disposal on land – CH_4

84. Italy uses the IPCC tier 2 methodology 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 noted that, although the Party uses country-specific values suggested by national experts for the methane generation rate constant (k), these k values did not result from experimental data in Italy, and the NIR does not provide sufficient documentation to support the application of these values to the national conditions. The ERT encourages Italy to provide further explanations and documentation to support the use of the chosen values for this parameter in its next annual submission, in order to improve the transparency of the inventory, and to make efforts to use parameters derived from experimental data.

85. The ERT notes that Italy uses information on the energy conversion efficiency factor to estimate the amount of CH_4 recovered, but this is not transparently reported in the NIR. In response to a question raised by the ERT during the review, the Party provided further information on the method used to estimate the amount of CH_4 recovered using the energy conversion efficiency factor. The ERT recommends that Italy enhance the information provided on how the amount of CH_4 recovered is estimated in the next annual submission, in order to improve the transparency of the inventory.

86. The ERT notes that, with regard to CH_4 emissions from managed and unmanaged landfill sites, the procedure used to establish the time series for the amount of waste disposed in managed and unmanaged landfill sites is not provided in the NIR. During the review, Italy provided the ERT with information on the estimation method using historical data related to the amount of waste disposed in unmanaged landfill sites. The ERT recommends that the Party provide this information, including the main assumptions and methods used to establish the historical data, in the next annual submission.

Wastewater handling – CH_4

87. The ERT notes that information on the CH_4 emissions from untreated wastewater is not provided in the NIR. The ERT encourages Italy to report on these emissions in the NIR and ensure that the emission estimates for untreated wastewater are included in the inventory, in order to improve the completeness of its reporting.

3. Non-key categories

Incineration – CO_2 and N_2O

88. The ERT notes that emissions from the incineration of industrial waste are estimated by waste type as hospital waste, waste oil, sludge and other waste. The ERT reiterates the recommendation from the previous review report that Italy improves the transparency of its reporting by including the amount of incinerated industrial waste with and without energy recovery in its next annual submission.

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

89. Under Article 3, paragraph 3, of the Kyoto Protocol, Italy has reported emissions and removals from afforestation and reforestation, and deforestation, and under Article 3, paragraph 4, of the Kyoto Protocol, the Party has reported emissions and removals from the elected activity forest management, for 2008 and 2009. Italy has chosen to account for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period.

90. The inventory of emissions and removals resulting from KP-LULUCF activities is complete. The emissions and removals from all KP-LULUCF activities were estimated and reported in accordance with the IPCC good practice guidance for LULUCF and decisions 15/CMP.1 and 16/CMP.1 and in accordance with the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1.

91. Italy uses the IPCC reporting method 1 for land areas subject to afforestation and reforestation, deforestation and forest management. The boundaries of the land areas are the same as the administrative boundaries of the Italian regions at the Nomenclature of Territorial Units for Statistics (NUTS) level 2 for all KP-LULUCF activities. Within each area, several units of land have been identified as either afforested, reforested, deforested or under forest management, and the spatial assessment threshold used to identify the areas under afforestation and reforestation, and deforestation is 0.5 ha, which is also the same threshold used to identify forest areas.

92. The ERT found that the methodological approaches, AD and EFs used to estimate emissions and removals from KP-LULUCF activities are consistent with those used to estimate emissions and removals from land use and land-use change reported under the Convention (LULUCF sector). Consequently, some of the issues raised in the discussion of the LULUCF sector of this report also apply to the KP-LULUCF activities, in particular: the issue of the use of a transition period of one year for the carbon stock changes in mineral soils; and the use of linear relationships between the carbon stock changes in mineral soils and above-ground biomass, which the ERT considers to be not clearly documented and unusual (see paras. 72 and 73 above). The ERT recommends that Italy implement the relevant recommendations for the LULUCF sector for the KP-LULUCF activities in a consistent manner.

93. Italy has provided in the NIR a quantitative uncertainty analysis for the removals and emissions from KP-LULUCF activities, and the overall uncertainty was estimated at 68.2 per cent.

94. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions following changes in EFs and in order to rectify identified errors. The most significant impact of these recalculations for 2008 was on afforestation and reforestation: net removals increased from 1,718.10 Gg CO_2 eq in 1990 to 6,328.6 Gg CO_2 eq (i.e. by approximately 2.7 times).

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

Afforestation and reforestation – CO_2

95. The Party has estimated the carbon stock changes for all carbon pools under afforestation and reforestation activities. The ERT notes that the estimates of the carbon stock changes in mineral soils are higher than those in living biomass, which the ERT considers to be unusual. During the review, the ERT found that this is mainly due to the use of a one-year transition period (see para.71 above) and the use of a linear relationship with above-ground biomass that is not clearly documented by the Party and has a high uncertainty (see para. 72 above). The ERT recommends that Italy apply a 20-year transition period and use the IPCC tier 1 method or develop alternative methodologies to estimate the carbon stock changes in mineral soils, in a consistent manner with the reporting on the LULUCF sector, in its next annual submission (see also para. 71 above).

Deforestation – CO_2

96. Italy has estimated the carbon stock changes for all carbon pools under deforestation activities. However, as reported in the LULUCF sector (see para. 70 above), given the fact that plantations were classified as part of cropland, the conversion of plantations to other non-forested land was not accounted for as a deforestation activity. The ERT considers that the decision to include plantations under cropland has not been clearly explained in the NIR and recommends that the Party include a more detailed justification for this choice.

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

Forest management – CO_2

97. Italy has estimated the changes in carbon stock in all carbon pools for all areas under forest management. However, the ERT noted that the CO_2 removals in mineral soils and dead wood accounted for 19.4 and 20.1 per cent, respectively, of the total removals from forest management activities. The ERT considers that the estimates of net removals from forest management could potentially be significantly overestimated. The ERT strongly recommends that Italy, in its next annual submission and in a consistent manner with the reporting on the LULUCF sector, use the IPCC tier 1 method or develop alternative scientific methodologies to estimate the carbon stock changes in mineral soils and dead wood, and include the additional information provided during the review process, which demonstrates in a transparent and verifiable manner, that soils pool is not a net source.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

98. 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 included in the SIAR on the SEF tables and the SEF comparison report.[14] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

99. Information on the accounting of Kyoto Protocol 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

[14] 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.

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 and on any records of non-replacement was found to be consistent with the information provided to the secretariat by the ITL, and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

100. The Party has addressed the recommendation in the previous review report [15] related to the confidentiality of publicly available information, as explained on page 488 of the NIR (annex 12).

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 the annex to decision 15/CMP.1. The ERT further noted from 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.

Calculation of the commitment period reserve

102. Italy has reported its commitment period reserve in its 2011 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

103. Italy reported that there have been no changes to 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

104. Italy reported that there were no relevant changes to the national registry during 2010. Procedures have been implemented throughout the year in order to contract a new IT supplier to provide technical support and to host and maintain the registry software. However, the transition to the new premises and the upgrade to a new software version occurred only in January 2011.

105. The ERT concluded that, taking into account the information provided by Italy, 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).

[15] FCCC/ARR/2010/ITA, paragraph 107.

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

106. Italy reported changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, since the previous annual submission. The ERT considers that the reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol is complete and has been transparently reported.

107. The information has been updated in the 2011 submission in order to reflect the current state of actions, and includes: the assessment of social, environmental and economic impacts of clean development mechanism and joint implementation projects; funding, capacity-strengthening and transfer of technology; and priority actions in the implementation of 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) The removal of subsidies associated with the use of environmentally unsound and unsafe technologies;

(c) 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; and 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 country Parties identified in Article 4, paragraphs 8 and 9, of the Convention to improve the 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

108. Italy made its annual submission on 15 April 2011. 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 (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 the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

109. 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 1990–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories and gases, except for CH_4 emissions from untreated wastewater, which were reported as “NE”.

110. 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.

111. The Party's inventory is in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, and generally in line with the IPCC good practice guidance for LULUCF. The ERT notes the high quality of the inventory of Italy; the methodological choices and comprehensive work on QA/QC are reflected in high levels of accuracy. The ERT commends the Party for the high level of quality of its inventory.

112. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and EFs, and in order to rectify identified errors. The impact of these recalculations on the national totals is an increase in emissions of 0.05 per cent for 2008. The main recalculations took place in the following categories:

(a) Energy industries;

(b) Solid waste disposal on land.

113. Italy has reported emissions and removals from activities under Article 3, paragraph 3 and 4, of the Kyoto Protocol for 2008 and 2009. The emissions and removals from afforestation and reforestation, deforestation and forest management were generally estimated in accordance with the IPCC good practice guidance for LULUCF and decisions 15/CMP.1 and 16/CMP.1. However, the ERT found that Italy could improve the estimates related to the LULUCF sector and KP-LULUCF activities. In particular, the ERT notes that the estimates of the carbon stock changes in mineral soils for the KP-LULUCF activities are not fully in line with the IPCC good practice guidance for LULUCF, with regard to the length of the transition period and the methodology used to relate the changes in the carbon stock to above-ground biomass (see paras. 72 and 73 above), and the Party did not provide transparent information justifying that plantations should not be considered forest land, in line with FAO definition and data reported by Italy to FAO (see paras. 70 and 96 above).

114. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions following changes in EFs and in order to rectify identified errors. The major impact of these recalculations was on afforestation and reforestation: net removals increased from 1,718.10 Gg CO_2 eq to 6,328.6 Gg CO_2 eq for 2008.

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

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

117. 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.

118. Italy has reported information under 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 2011 annual submission. The information was provided on 15 April 2011, updating the information provided in the 2010 submission, and is complete and transparent.

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

(a) Ensure that the inventory is fully complete, by including emissions of CH_4 from untreated wastewater (see paras. 9 and 87 above);

(b) Further enhance the transparency of reporting by including additional explanations in the NIR for the trends of IEFs or emissions, in line with the explanations

provided during the review, and at the same time ensure time-series consistency (see paras. 38, 39, 40, 43, 50, 53, 86 and 88 above).

120. In the course of the review, the ERT formulated a number of recommendations relating to specific sectors and categories. The key recommendations are that Italy:

(a) Provide more detailed explanations of the differences between the reference and the sectoral approaches and the differences between the inventory data and the IEA data (see paras. 33 and 34 above);

(b) Enhance the transparency of its reporting by providing more information on: the methodology used to verify and certify the EU ETS data which is used in the estimates of emissions from the energy and industrial processes sectors (see paras. 47 and 49 above); the composition of the natural gas consumed in the country (see para. 31 above); the methodology used to estimate emissions from adipic acid production (see para. 51 above) and aluminium production (see para. 53 above); the distribution of livestock and manure management by climatic region (see para. 63 above); the linear relationship between above-ground biomass and soil carbon in mineral soils (see paras. 72 and 73 above); the choice of the methane generation rate constant (see para. 84 above); and the use of energy conversion efficiency factors to estimate CH_4 recovery (see para. 85 above);

(c) Provide more transparent explanations for the rationale used for classifying plantations as cropland (see paras. 70 and 97 above), and of the difference between data reported to FAO and the GHG annual inventory, in its next annual submission;

(d) Recalculate the estimates of the carbon stock changes in mineral soils for land-use conversions using a 20-year transition period (see para. 71 above).

IV. Questions of implementation

121. 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. *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. *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 2011. Available at <http://unfccc.int/resource/docs/2011/asr/ita.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <http://unfccc.int/resource/webdocs/sai/2011.pdf>.

FCCC/ARR/2010/ITA. Report of the individual review of the greenhouse gas inventory of Italy submitted in 2010. Available at <http://unfccc.int/resource/docs/2010/arr/ita2.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 methodology and assumptions used. The following documents[1] were also provided by Italy:

ISPRA. 2011. *Quality Assurance/Quality Control Plan for the Italian Emission Inventory. Year 2011*. Istituto Superior per la la Protezione e Ricerca Ambientale. Available at <www.isprambiente.it>.

Tabacc hi, G., De Natale, F. & P. 2010. Gasparini. *Coerenza ed entità delle statistiche forestali Stime degli assorbimenti netti di carbonio nelle foreste italiane*. Sherwood n.165 Luglio-Agosto 2010.

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
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
kg	kilogram (1 kg = 1,000 grams)
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable
NE	not estimated
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change