Advance Version

COMPLIANCE COMMITTEE

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

Note by the secretariat

The report of the individual review of the annual submission of Greece submitted in 2010 was published on 11 May 2011. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2010/GRC, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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

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

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2010 annual submission of Greece, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 13 to 18 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Penelope Reyenga (Australia) and Mr. Klaus Radunsky (Austria); energy – Ms. Maria Liden (Sweden), Ms. Veronika Ginzburg (Russian Federation), Mr. Ricardo Fernandez (European Union (EU)) and Mr. Daniel Tutu Benefoh (Ghana); industrial processes – Mr. Jos Olivier (Netherlands), Mr. Samir Tantawi (Egypt) and Mr. Predrag Novosel (Montenegro); agriculture – Mr. Jacques Bamikole Kouazounde (Benin) and Ms. Rocio Danica Condor (Italy); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil) and Mr. Ravi Nijavalli (India); and waste – Mr. Davor Vesligaj (Croatia) and Mr. Juraj Farkas (Slovakia). Ms. Reyenga and Ms. Krug were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Mr. Harald Diaz-Bone (UNFCCC secretariat).

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

B. Emission profiles and trends

3. In 2008, the main greenhouse gas (GHG) in Greece was carbon dioxide (CO_2), accounting for 85.6 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (6.8 per cent) and nitrous oxide (N_2O) (5.5 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 2.0 per cent of the overall GHG emissions in the country. The energy sector accounted for 81.0 per cent of total GHG emissions, followed by industrial processes (8.8 per cent), agriculture (6.9 per cent), waste (3.0 per cent) and solvent and other product use (0.2 per cent). Total GHG emissions amounted to 128,519.93 Gg CO_2 eq and increased by 20.6 per cent between the base year[2] and 2008.

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, of the Kyoto Protocol and forest management as the elected activity under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

[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 CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 1
Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2008[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A sources		CO_2	83 274.33	83 274.33	86 775.84	103 197.28	113 361.60	111 435.76	114 444.50	110 063.10	32.2
		CH_4	9 785.31	9 785.31	9 940.89	9 964.14	9 016.87	9 045.87	8 858.59	8 783.13	–10.2
		N_2O	10 199.86	10 199.86	8 957.18	8 658.46	7 893.13	7 638.02	7 877.81	7 101.18	–30.4
		HFCs	3 262.03	935.06	3 262.03	4 274.52	3 957.28	2 035.64	2 110.06	2 490.83	–23.6
		PFCs	82.97	257.62	82.97	148.38	71.31	71.16	58.66	74.17	–10.6
		SF_6	3.59	3.07	3.59	3.99	6.45	8.37	9.92	7.53	110.0
KP-LULUCF	Article 3.3[b]	CO_2								–346.75	
		CH_4								NA	
		N_2O								NA	
	Article 3.4[c]	CO_2	NA							–2 052.47	NA
		CH_4	NA							6.94	NA
		N_2O	NA							0.70	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 CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. 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 latest inventory year must be reported.

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

			Gg CO_2 eq								*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A		Energy	77 397.26	77 397.26	80 853.81	97 137.69	106 709.18	104 925.54	108 013.88	104 158.76	34.6
		Industrial processes	12 321.38	10 168.55	12 269.22	13 808.14	13 792.68	11 525.04	11 516.37	11 242.49	–8.8
		Solvent and other product use	308.34	308.34	299.82	306.61	309.29	311.92	313.41	314.13	1.9
		Agriculture	11 348.67	11 348.67	10 328.65	9 988.70	9 441.76	9 297.67	9 576.32	8 918.48	–21.4
		Waste	5 207.48	5 207.48	5 271.00	5 005.62	4 053.73	4 174.64	3 939.56	3 886.07	–25.4
		Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
		LULUCF	NA	–2 477.16	–3 179.85	–3 034.38	–3 148.87	–3 232.45	–3 026.95	–3 176.18	NA
		Total (with LULUCF)	**NA**	**101 953.14**	**105 842.65**	**123 212.38**	**131 157.76**	**127 002.36**	**130 332.59**	**125 343.75**	**NA**
		Total (without LULUCF)	**106 583.13**	**104 430.30**	**109 022.50**	**126 246.76**	**134 306.63**	**130 234.81**	**133 359.54**	**128 519.93**	**20.6**
KP-LULUCF	Article 3.3[b]	Afforestation & reforestation								–350.63	
		Deforestation								3.88	
		Total (3.3)								**–346.75**	
	Article 3.4[c]	Forest management								–2 044.82	
		Cropland management	NA							NA	NA
		Grazing land management	NA							NA	NA
		Revegetation	NA							NA	NA
		Total (3.4)	**NA**							**–2 044.82**	**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, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. 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.

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 tonnes of carbon dioxide equivalent

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	601 802 826		601 802 826	
Annex A emissions for current inventory year				
CO_2	109 760 975.95		110 063 101.23	
CH_4	7 866 528.28		8 783 125.55	
N_2O	7 100 958.94		7 101 178.97	
HFCs	2 077 340.90		2 490 825.08	
PFCs	74 169.85		74 169.85	
SF_6	7 528.50		7 528.50	
Total Annex A sources	**126 887 502.43**		**128 519 929.18**	
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	–350 625.67		–350 625.67	
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	3 879.58		3 879.58	
Activities under Article 3, paragraph 4, for current inventory year[d]				
3.4 Forest management for current year of commitment period	–2 044 821.24		–2 044 821.24	
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviation: NA = not applicable.

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

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

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

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

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

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

7. Greece officially submitted revised emission estimates on 17 September and 27 October 2010, in response to questions raised by the expert review team (ERT) in the course of the review. The recalculations cover the entire time series and address all the inventory issues (not related to LULUCF) raised by the ERT during the review. The values in this report are those submitted by the Party on 27 October 2010. Where necessary, the ERT also used previous years' submissions during the review.

8. 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]

9. During the review, Greece provided the ERT with additional information and documents which are not part of the annual submission. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

10. The inventory covers most source and sink categories for the period 1990–2008 and is complete in terms of years and geographical coverage. The ERT noted that Greece improved the completeness of its inventory for its 2010 submission, reporting estimates for some categories for the first time (e.g. in the LULUCF sector). However, Greece did not report direct and indirect N_2O emissions from the application of sludge to agricultural soils, PFC emissions from fire extinguishers, HFC and PFC emissions from solvents, CO_2 emissions from limestone and dolomite use for magnesia production, or CH_4 emissions from industrial wastewater (sludge), categories for which the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) include estimation methodologies. In response to questions raised by the ERT, Greece provided estimates for most of these categories and the notation key used to report HFCs and PFCs was corrected,

[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.

supported by relevant evidence, to not occurring ("NO"). In addition, Greece did not provide estimates for a range of mandatory and non-mandatory LULUCF categories and pools, of potential emissions of fluorinated gases (F-gases) and for other categories for which there are no methodologies available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The ERT encourages Greece to report, in its next annual submission, estimates for categories not yet addressed, in order to further improve the completeness and accuracy of its inventory.

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

Overview

11. The ERT concluded that the national system continues to perform its required functions. In addition, the ERT noted that the national system was continuing to improve regarding the reporting on KP-LULUCF. The ERT commends Greece for the efficiency of its national system, noting that the Party was able to make an official submission in response to the issues raised by the ERT within the review week. The Party described the changes in the national system since the previous annual submission and these are discussed in chapter II.G.3 of this report.

Inventory planning

12. The NIR describes the national system and institutional arrangements for the preparation of the inventory. The Ministry of Environment, Energy and Climate Change (MEECC) (former Ministry of Environment, Physical Planning and Public Works) has overall responsibility for the national inventory. The School of Chemical Engineering of the National Technical University of Athens has the technical and scientific responsibility for the compilation of the annual inventory, and various ministries and agencies have the responsibility of ensuring the provision of data. International and national associations, along with individual industrial companies, contribute to the provision of data and the development of methodologies. Identifying areas for further improvement in order to comply with the IPCC good practice guidance and 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) is part of the quality assurance/quality control (QA/QC) plan.

13. In order to address the gaps in its reporting on the LULUCF sector and as part of an improvement programme for the LULUCF sector that began in 2008, the Party has started to develop a new database on land-use changes within MEECC. The implementation of this improvement programme allowed Greece to provide estimates for a range of land-use change categories for the first time in its 2010 submission. The ERT welcomes this improvement and recommends that the Party continue its efforts to strengthen its national system so that it can perform fully all its required functions, particularly those related to reporting on the LULUCF sector and activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Inventory preparation

Key categories

14. Greece has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2010 submission. The key category analysis performed by the Party and that

performed by the secretariat[4] produced similar results for 2008. Greece has included the LULUCF sector in its key category analysis, which was performed in accordance with 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). The ERT acknowledges that Greece uses the key category analysis as a tool to support and guide improvements to its inventory. The ERT encourages Greece to use a finer disaggregation of categories in its next annual submission and also to consider using a qualitative approach to identifying key categories so as to address those categories that have very high uncertainties (e.g. solvent and other product use).

15. Greece has identified CO_2 emissions from afforestation and reforestation and forest management under Article 3, paragraphs 3 and 4, of the Kyoto Protocol as key categories. The NIR and KP-LULUCF tables provide details on the criteria used to determine the key categories.

Uncertainties

16. Following the recommendation of the previous ERT, Greece has provided a tier 1 uncertainty analysis for 58 categories excluding the LULUCF sector (compared with 48 categories in its 2009 submission), for the CO_2, CH_4 and N_2O emissions in total, for the inventory overall and, in addition, for 11 categories in the LULUCF sector. The ERT commends Greece for providing a quantitative uncertainty analysis for all categories for which it has estimated emissions and reiterates the encouragement of the previous ERT that Greece use more country-specific information on uncertainty for categories where IPCC default uncertainty values have been used.

17. The ERT noted that the country made a significant effort to document the uncertainty values used and to use, to the extent possible, country-specific information in its uncertainty analysis. Greece used the uncertainty analysis to prioritize further improvements to its inventory.

18. The ERT also noted that the estimated quantitative uncertainty for the total GHG emissions (without LULUCF) was 7.9 per cent for 2008, while the estimated uncertainty related to the emissions trend was 10.9 per cent. The estimated quantitative uncertainty for the total GHG emissions (with LULUCF) for the same year was 8.2 per cent, while the estimated uncertainty related to the emissions trend was 11.2 per cent. Compared with the values for 2007, the uncertainty values for 2008 without LULUCF have slightly increased, while those with LULUCF have decreased.

Recalculations and time-series consistency

19. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted Greece's efforts to ensure time-series consistency in its estimates. The ERT noted that recalculations reported by Greece of the time series 1990–2007 have been undertaken to take into account changes/improvements in activity data (AD) (all sectors), emission factors (EFs) (e.g. in the energy sector) and methodologies (e.g. in the LULUCF sector), and recommendations made in previous review reports. The total effect of the recalculations was a 2.1 per cent decrease in the estimate of total GHG

[4] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the 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.

emissions for the base year and a 0.02 per cent increase in the estimate of total GHG emissions for 2007. Some of the most significant changes in the estimates for 2007 are a 155.5 per cent increase in the estimate of HFC emissions from consumption of halocarbons and SF_6, a 130.0 per cent increase in the estimate of CO_2 emissions from metal production and a 22.8 per cent decrease in the estimate of N_2O emissions from agricultural soils. The rationale for most of the recalculations is provided in the NIR and in CRF table 8(b). However, the ERT noted that Greece carried out recalculations for the LULUCF sector that are not sufficiently documented in the NIR or in CRF table 8(b). The ERT strongly recommends that the Party provide explanations/justifications for these recalculations in a comprehensive and clear manner in its next annual submission.

Verification and quality assurance/quality control approaches

20. Greece's QA/QC system is based on standard 9001:2000 of the International Organization for Standardization, was established in 2004 and has been developed in line with the IPCC good practice guidance. The QA/QC manual was last revised in May 2008. There are yearly internal audits of the inventory as well as audits by external experts, the last one was conducted in May 2009. The findings of that last audit were addressed by the Party in preparing its 2010 inventory submission.

21. The present ERT noted that not all recommendations of previous ERTs regarding QA/QC have been fully addressed by the Party (see para. 26 below). Acknowledging Greece's efforts to improve its inventory by using data included in verified European Union emissions trading scheme (EU ETS) reports, the present ERT reiterates the recommendation of the previous ERT that Greece provide additional information on its QA/QC procedures for the data supplied by external sources. The ERT also reiterates the recommendation of previous ERTs that Greece further improve its QA/QC procedures and verification activities by expanding their application to all key categories, including, for example, fugitive emissions and the LULUCF categories. The ERT urges the Party to address these issues in a timely manner.

22. In addition, the Party is encouraged to provide information in its next annual submission on training activities or other activities undertaken to guarantee the necessary capacity of the staff responsible for the inventory development process in accordance with paragraph 12(c) of the annex to decision 19/CMP.1. The ERT recommends that the Party nominate its experts currently responsible for the inventory to the UNFCCC roster of experts, with a view to their participation in the review process.

Transparency

23. Greece has further improved its NIR, which includes well-structured and clear information on key categories, methods, data sources, uncertainty estimates, recalculations, QA/QC procedures and verification activities for most of the categories. However, the ERT recommends that Greece include in the NIR additional information on some categories as addressed in the specific sector chapters of this report (e.g. on emissions from military activities and on LULUCF) and on the QA/QC procedures for the data supplied by external sources, as well as explanations for some of the factors used in estimating its emissions (e.g. leakage rates for refrigeration and air conditioning for the categories transport refrigeration and mobile air-conditioning).

Inventory management

24. Greece has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews,

and documentation on annual key categories and key category identification, and planned inventory improvements. The centralized archiving system is located at MEECC and is updated annually upon completion of the inventory cycle. The ERT noted that during the review Greece was able to provide all requested additional archived information in a timely manner.

3. Follow-up to previous reviews

25. Greece has systematically addressed the issues raised by previous ERTs and followed their recommendations where appropriate or possible. Thus, in response to the recommendations of the previous ERT, the Party has, in its 2010 submission:

(a) Reported CRF table 7 for all years of the time series;

(b) Improved the completeness of its inventory;

(c) Reported an uncertainty analysis for 1990;

(d) Made corrections to incorrect/poorly justified values (e.g. fuel consumption for the chemicals subcategory under manufacturing industries and construction, the nitrogen (N) excretion value for goats and the oxidation factor for solid waste disposal sites (SWDS));

(e) Improved transparency by including additional information in the NIR (e.g. on completeness related to the industrial processes sector);

(f) Introduced new methodological approaches in the LULUCF sector, seeking to improve accuracy and completeness;

(g) Improved time-series consistency in the energy sector by reallocating emissions between the energy and industrial processes sectors.

26. The ERT concluded, however, that Greece has not implemented all the recommendations made in the previous review report, for example that it:

(a) Provide category-specific information on QC procedures for all key categories and for other categories in which significant methodological and/or data changes have occurred;

(b) Include elements of the QA/QC plan and the quality management system and its records in an annex to the NIR;

(c) Improve transparency by providing more complete information on the identification of country-specific EFs and parameters, explanations for methodological choices, and information on the sources and background of AD;

(d) Establish more specific procedures to underpin the periodic review of the QA/QC plan and the quality management system, using information obtained from the implementation of its QA/QC programme, including from an independent audit.

27. The previous recommendations not yet addressed by the Party relating to specific categories are presented in the relevant sector chapters of this report.

4. Areas for further improvement

Identified by the Party

28. The 2010 NIR identifies the following areas for further improvement:

(a) Updating the fleet population and composition database, improving the verification of fuel consumption for road transportation and developing a more detailed and accurate methodology for estimating emissions from aviation (energy sector);

(b) Improving the time series for cement production and updating provisional AD (e.g. for lime production, F-gas consumption for fire extinguishers, and solvent and other product use) (industrial processes sector and solvent and other product use sector);

(c) Using the tier 2 methodology to estimate CH_4 emissions from enteric fermentation in cattle, and providing better information on manure management systems (agriculture sector);

(d) Using a new mapping system based on remotely sensed data to provide complete and up-to-date estimates of all land uses and land-use changes for the 2011 submission and generating country-specific estimates for living biomass for land converted to forest land (LULUCF sector);

(e) Developing a database with data on the amount and composition of waste, and a new methodology for estimating emissions from industrial wastewater (waste sector).

Identified by the expert review team

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

(a) Further improvement and strengthening of the national system, in particular with respect to the LULUCF sector (see para. 13 above);

(b) Improvement of the key category analysis by using a finer disaggregation of categories and addressing categories with very high uncertainties (see para. 14 above);

(c) Improvement of the implementation and coverage of the QA/QC activities (see para. 21 above);

(d) Further improvement of the transparency of the explanations/justifications provided in relation to the QA/QC procedures for the data supplied by external sources and country-specific methodologies, data, EFs and parameters (see para. 23 above);

(e) Ensuring consistency between the amounts of natural gas used as feedstock in industrial processes (ammonia production) and/or for hydrogen production in refineries (reported under petroleum refining) and the amount reported in CRF table 1.A(d) and in the reference approach (see para. 41 below);

(f) Providing transparent and comprehensive information on all recalculations (e.g. for the LULUCF sector) (see para. 19 above);

(g) Addressing the recommendations made in previous review reports that have not yet been addressed (see para. 26 above).

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

B. Energy

1. Sector overview

31. The energy sector is the main sector in the GHG inventory of Greece. In 2008, emissions from the energy sector amounted to 104,158.76 Gg CO_2 eq, or 81.0 per cent of total GHG emissions. Since 1990, emissions have increased by 34.6 per cent, owing to improving living standards, growth in the services sector, and an increase in the vehicle fleet and transportation activities. Within the sector, 55.5 per cent of the emissions were

from energy industries, followed by 21.8 per cent from transport, 12.3 per cent from other sectors and 9.0 per cent from manufacturing industries and construction. The remaining 1.5 per cent were fugitive emissions.

32. The inventory for the sector is generally complete. CO_2, CH_4 and N_2O emissions from geothermal energy production and CH_4 and N_2O emissions from lubricants in marine bunkers, for which there are no default IPCC methodologies, are reported as not estimated ("NE"). Greece documented the not-estimated categories in CRF table 9, but only geothermal energy production is documented in the NIR. The ERT noted that other mobile combustion was reported as "NO" although, in accordance with the Revised 1996 IPCC Guidelines, military fuel use should be reported under this category. In response to a question raised by the ERT, Greece stated that, for confidentiality reasons, military fuel use is not reported separately but included under the relevant categories in the energy sector. The ERT recommends that Greece report other mobile combustion as included elsewhere ("IE"), providing the relevant explanation, in its next annual submission.

33. Greece uses IPCC methodologies to estimate emissions from stationary combustion and the COPERT IV model to estimate CH_4 and N_2O emissions from road transportation. The EFs used are a mixture of default, country-specific and plant-specific EFs for stationary combustion and core inventory of air emissions (CORINAIR) EFs for road transportation. The ERT noted that Greece uses mainly EU ETS data for plant-specific energy consumption, EFs and net calorific values (NCVs) for stationary combustion in the energy industries and manufacturing industries and construction categories. The ERT further noted that corrections were made to AD provided in the national energy balance for many categories in the energy sector because of the use of EU ETS data, plant-specific data, and assumptions for the correlation of data from different information sources (e.g. the AD on landing and take-off (LTO) and civil aviation fuel used, and on consumption of lubricants for road transportation). The present ERT agrees with the conclusion of the previous ERT that the Party has not provided sufficient information in its NIR to confirm whether the EU ETS data have been prepared and incorporated in the inventory submission in line with the IPCC good practice guidance. The ERT recommends that Greece provide detailed information (e.g. in an annex to the NIR) on the EU ETS data used, including an analysis of their completeness and consistency with the IPCC methodology, and on the verification procedure applied to ensure conservation of the fuel mass balance and completeness of the data, and report on the progress made with regard to this issue in its next NIR.

34. The reporting on the energy sector is generally transparent and Greece provides detailed information on the methodologies used, descriptions of assumptions, the rationale for recalculations and details of planned improvements in the sector. However, the ERT noted that the Party could further enhance transparency by providing in the NIR more background documentation on country-specific and plant-specific EFs (e.g. the CO_2 EFs for lignite and natural gas), AD (e.g. on aviation gasoline used for civil aviation) and disaggregated AD (e.g. vehicle population by class and rate of fuel consumption, lignite used in energy industries and manufacturing industries, and the mixture of solid fuels used in energy industries and chemical production) and the ERT recommends that Greece do so in its next NIR. The ERT commends Greece for its efforts to follow the recommendation of the previous ERT with regard to ensuring time-series consistency when using EU ETS data in the energy sector, and recommends that the Party include the relevant detailed information provided during the review in its next NIR, in order to improve transparency.

35. A number of recalculations have been carried out in the energy sector, some in response to the recommendations of the previous ERT (e.g. the reallocation of some emissions to the industrial processes sector, ensuring time-series consistency in cases where country-specific EFs were developed based on the EU ETS data) and some owing to the use

of better AD (plant-specific information from the EU ETS for energy industries) and the use of country-specific, plant-specific EFs (e.g. the country-specific CO_2 EF for natural gas in energy industries). In addition, some recalculations were performed to correct errors that were made in previous annual submissions and detected during QC procedures. The recalculations affected all the categories in the energy sector and led to decreases in the estimates of emissions by 1.1 and 0.1 per cent for 1990 and 2007, respectively. The revised estimates submitted by the Party during the review added 133.57 Gg CO_2 eq, or 0.1 per cent, to the estimate of total emissions from the sector in 2008, as a result of the revised estimate for CO_2 emissions from agriculture/forestry/fishing (92.21 Gg) due to a data-entry mistake, and the Party's response to the potential problem related to the reporting of the non-energy use of natural gas (41.36 Gg) (see para. 41 below).

2. Reference and sectoral approaches

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

36. For 2008, the estimates of apparent consumption and CO_2 emissions derived from the reference approach were 1.0 per cent lower and 0.2 per cent higher, respectively, than those derived from the sectoral approach. Greece attributes this to statistical differences in fuel consumption, losses and the use of different EFs for the two approaches. The ERT noted that the difference between the estimates derived from the two approaches, especially for gaseous fuels, could also be caused by the incorrect consideration of gas works gas as a secondary gaseous fuel, which is reported in the sectoral approach but not in the reference approach. The ERT recommends that Greece allocate gas work gas to the secondary solid fuels in its next annual submission.

37. Apparent consumption in the reference approach corresponds closely to the data provided to the International Energy Agency (IEA). However, the ERT found discrepancies with the IEA data, especially with regard to the stock change for liquid and gaseous fuels. This may have been caused by the incorrect consideration of non-energy use of fuels in the reference approach. The ERT noted that, according to the Revised 1996 IPCC Guidelines, in the reference approach the amount of fuel reallocated to the industrial processes sector should be indicated in CRF table 1.A(d) and not extracted from the stock change, as was done by Greece. The ERT recommends that Greece follow the IPCC approach for its next annual submission.

International bunker fuels

38. During the review, the ERT noted that the consumption of fuel for international aviation reported in the CRF tables is systematically higher than the IEA data. The ERT also noted that jet kerosene used for international aviation has not been reported in CRF table 1.A(b) for the period 2006–2008 and that for the other years of the time series the data in CRF tables 1.A(b) and 1.C do not correlate. In response to a question raised by the ERT on this matter, Greece stated that "total inland consumption" from the energy balance includes both domestic and bunker fuels and that this amount is further disaggregated on the basis of the LTO data. However, to ensure consistency with the national energy balance, the fuel used for international aviation has not been reported in the reference approach. This is not in line with the Revised 1996 IPCC Guidelines. The ERT recommends that Greece cross-check data on jet kerosene, correct them in CRF tables 1.A(b) and 1.C and ensure time-series consistency in its next annual submission.

39. Greece reports CH_4 and N_2O emissions from lubricants from marine bunkers as "NE", owing to a lack of appropriate EFs. However, since the Party reports emissions of these gases from lubricants used for national navigation, the ERT recommends that Greece

provide estimates for the non-estimated gases using the EFs for navigation in its next annual submission.

Feedstocks and non-energy use of fuels

40. Following the recommendation of the previous ERT, Greece allocated a part of natural gas, petroleum coke and solid fuels used as feedstock in manufacturing industries to the industrial processes sector. However, the ERT identified a discrepancy in the figures for natural gas consumption reported for ammonia production in the NIR and in CRF table 1.A(d). In response, Greece explained that table 3.9 of the NIR and CRF table 1.A(d) include only the quantities of the fuels used as feedstock and allocated to the energy sector and do not include the amounts of the fuels used as feedstock and allocated to the industrial processes sector. This is not in line with the Revised 1996 IPCC Guidelines. The ERT recommends that Greece report properly in CRF tables 1.A(b) and 1.A(d) all feedstocks and non-energy use of fuels (as identified in the national energy balance), the associated CO_2 emissions and the category/sector under which they are allocated in the inventory.

41. The ERT found that a part of the natural gas used as feedstock (non-energy use) is still accounted for in the energy sector under chemical industry, and that this leads to large inter-annual variation and low implied emission factors (IEFs) for CO_2, CH_4 and N_2O emissions from gaseous fuels. A similar problem was identified by the ERT in relation to the lubricants included in liquid fuels for iron and steel which are used for non-energy purposes. During the review, Greece recalculated and resubmitted all emission estimates related to the non-energy use of natural gas, reallocating natural gas used as feedstock to ammonia production (industrial processes sector) and leaving only the energy use of natural gas in the subcategory chemical industry (energy sector). Greece also used revised AD to estimate emissions from the non-energy use of natural gas in hydrogen production and reported these emissions under petroleum refining. The ERT noted that there are still inconsistencies between the amount of natural gas used as feedstock for ammonia production and/or for hydrogen production in refineries and the updated data on natural gas reported in CRF table 1.A(d), and recommends that Greece check the consistency of these figures and correct them as necessary.

3. Key categories

Stationary combustion: solid fuels – CO_2

42. The ERT noted that the NCVs and carbon EFs for lignite are significantly different for energy industries and for manufacturing industries and construction. In response to a question raised by the ERT during the review, Greece provided detailed information explaining and justifying this difference, including that the lignite is distributed from different mining fields. The ERT recommends that Greece include this information in its next NIR.

Stationary combustion: gaseous and liquid fuels – CO_2

43. The ERT noted that the estimates of emissions of CO_2, CH_4 and N_2O from combustion of gaseous and liquid fuels in petroleum refining were recalculated for the years 2005–2007, on the basis of the plant-specific data of refineries on the amounts of natural gas and naphtha used for hydrogen production. However, it was only during the review that Greece provided detailed explanations of the recalculations made for the entire time series and the assumptions made. The ERT recommends that Greece report relevant information, including on recalculations of AD and EFs for the entire time series, as provided to the ERT during the review, in its next annual submission.

44. The ERT found significant changes in the EFs for domestic and imported natural gas presented in the Party's 2010 NIR compared with those reported in the previous NIR. In response to a question raised by the ERT, Greece indicated that the CO_2 EF for natural gas was calculated for each year of the time series using country-specific data on the chemical composition of natural gas, and that for public electricity and heat production for the years 2005–2008 the EFs were based on plant-specific data (from the EU ETS reports). The ERT commends Greece's efforts to use country-specific and plant-specific EFs for key categories, and recommends that the Party include information on the data on chemical composition used to calculate the CO_2 EFs for natural gas and the background data used for the calculation of plant-specific EFs in its next annual submission.

Civil aviation: liquid fuels – CO_2

45. The ERT noted that the data on jet kerosene in the CRF tables are high compared with the IEA data. Also, the Party's inventory includes the consumption of aviation gasoline for civil aviation, while no such consumption is included in the IEA data. Greece explained that, since there is a discrepancy between the number of LTOs and the corresponding fuel consumption from the national energy balance, the adjustment applied to the estimate for the base year[5] is continuously applied in the estimation of CO_2 emissions from civil aviation. The ERT recommends that Greece continue its efforts to estimate the country-specific share of LTOs and the corresponding fuel consumption, and report any progress on this matter in its next annual submission.

Road transportation: liquid fuels – CO_2

46. The ERT noted that Greece continues to apply the method used by the ERT in the initial review[6] for calculating the consumption of lubricants for road transportation, which is based on the average lubricant consumption/fuel consumption ratio for the cluster of countries for the whole time series rather than on the data from the national energy statistics. The present ERT reiterates the recommendation of previous ERTs that Greece verify the data on lubricants used for road transportation and report thereon in its next annual submission.

47. The ERT also noted that inadequate information is provided in the NIR on the methodology used to split the AD for road transportation into the different calculation categories. The ERT recommends that Greece provide more detailed information on and justification for the AD on vehicle fleet population by class, fuel consumption rate, distance travelled and fuel use.

48. The ERT further noted that Greece used the IPCC default CO_2 EFs for liquid fuels to estimate emissions for the key categories of road transportation and domestic navigation, and that the gasoline CO_2 EF used by the Party is lower than that for the cluster of its neighbouring countries. The ERT encourages Greece to develop and apply country-specific EFs for estimating CO_2 emissions from road transportation and domestic navigation, since these are key categories.

4. Non-key categories

Stationary combustion: gaseous fuels – CH_4 and N_2O

49. The changes in the IEFs for gaseous fuels in the subcategories food processing, beverages and tobacco, commercial/institutional and residential within the time series are large (e.g. the N_2O IEF changes from 2.5 kg/TJ for the period 1990–1995 to 1 kg/TJ for the

[5] See document FCCC/IRR/2007/GRC, paragraph 188 and annex III.
[6] See document FCCC/IRR/2007/GRC, paragraph 198 and annex III.

period 1998–2008). Greece attributes these changes to the introduction of the use of natural gas after 1995, which was used in addition to or instead of the gas works gas previously used. The ERT noted that, in accordance with the Revised 1996 IPCC Guidelines, gas works gas is considered a secondary solid fuel and should not be reported under gaseous fuels. The ERT recommends that Greece reallocate gas works gas to the appropriate fuel group in its next annual submission.

Stationary combustion: solid fuels – CH_4

50. The ERT noted unusual trends in the CH_4 IEF for solid fuels in manufacturing industries and construction: after a constant IEF (1 kg/TJ) for the period 1993–2004, in the following years of the time series the IEF shows inter-annual changes of 5–20 per cent. Greece explained that these changes were due to the introduction of alternative fuels, such as scrap tyres and other waste, in cement plants since 2005. The ERT recommends that Greece report scrap tyres and other waste used in cement production as other fuels, separately from solid fuels, in its next annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

51. In 2008, emissions from the industrial processes sector amounted to 11,242.49 Gg CO_2 eq, or 8.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 314.13 Gg CO_2 eq, or 0.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 8.8 per cent in the industrial processes sector and increased by 1.9 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the closure of the hydrochlorofluorocarbon-22 (HCFC-22) manufacturing plant; in addition, N_2O emissions from nitric acid production decreased by about two thirds, owing to decreased production. On the other hand, a large increase in HFC emissions and an increase in CO_2 emissions from cement production (by 7.2 per cent) were observed. Within the sector, 53.8 per cent of the emissions were from cement production, followed by 20.1 per cent from HFC emissions from refrigeration and air-conditioning equipment and 5.8 per cent from ferroalloys production. The remaining 20.2 per cent were from other categories.

52. The inventory for the industrial processes sector is complete except for CO_2 emissions from carbonate use in magnesia production under limestone and dolomite use, for which estimates were provided during the review. The notation key "NE" for PFC emissions from fire extinguishers and HFC and PFC emissions from solvents was revised since PFC and HFC emissions from these subcategories are not occurring. In addition, Greece does not report potential emissions of F-gases when actual emissions of specific gases are reported. The ERT encourages Greece to provide estimates of these potential emissions in its next annual submission.

53. The inventory for the industrial processes sector is generally transparent and Greece provides detailed information on the methodologies used and descriptions of assumptions. However, the ERT recommends that the Party further enhance transparency by providing specific information in the NIR on the tier of methodology used for each (sub)category, such as that provided for cement production during the review.

54. Greece performed recalculations of its estimates of CO_2 emissions from ferroalloys production and limestone and dolomite use (reallocation), and of HFC emissions from refrigeration and air-conditioning equipment (updated AD in response to recommendations of the previous ERT) and from foam blowing and fire extinguishers (estimated for the first time). The recalculations resulted in an increase in the estimate of sectoral emissions by 5.2

and 20.4 per cent for the base year and 2007, respectively. In addition, N_2O from its use for anaesthesia and from aerosol cans have been added as sources (contributing 153.45 Gg CO_2 eq in 2008) in the solvent and other product use sector. The ERT commends the Party for the improved completeness of its inventory. The revised estimates submitted by the Party during the review added an additional 582.04 Gg CO_2 eq, or 5.5 per cent, to the estimated total emissions from the sector in 2008 (owing to the addition of emissions from carbonate use in magnesia production under limestone and dolomite use (182.48 Gg CO_2 eq), and the recalculation of CO_2 emissions from ammonia production (–13.94 Gg CO_2) (see paras. 41 above and 57 below) and HFC emissions from transport refrigeration and mobile air-conditioning (413.48 Gg CO_2 eq) (see para. 60 below).

55. Most of the recommendations of the previous ERT for this sector have been implemented by the Party. However, information justifying the time-series consistency of the EF for iron and steel production between the period 1990–1994 and the period 2005–2009, when EU ETS data were used, was not provided in the NIR. The ERT recommends that Greece provide this information in its next annual submission. For cement, lime and glass production this information was provided. The ERT considers that the Party should enhance transparency by providing information on the actual sources (not data providers) of AD for HFC emissions from substitutes for ozone-depleting substances, and recommends that Greece provide this information in its next annual submission.

2. Key categories

Cement production – CO_2

56. For estimating emissions from cement production, the Party applied a tier 3 method for the period 2005–2008 and a tier 2 method for the previous years of the time series, with the overlap method used to ensure the consistency of the time series. The ERT commends Greece for its clear and transparent description of this category, except for the determination of the EF for the period 1990–2004, on which the ERT recommends that Greece include more information in the NIR, such as that provided during the review week.

Ammonia production – CO_2

57. The natural gas used as feedstock is the AD used to estimate emissions from ammonia production, which complies with the tier 1a method from the Revised 1996 IPCC Guidelines. However, there is no direct information in the NIR on the EF applied by the Party. Based on the data in the NIR, the EF for 2008 was calculated by the ERT to be 56.1 t CO_2/TJ, which corresponds to the IPCC default carbon (C) content. This is different from the country-specific carbon content of 15.12–16.33 t C/TJ provided in table 3.13 of the NIR and the EF used for natural gas combustion in the chemical industry reported for chemicals (under manufacturing industries and construction) in CRF table 1.A(a) (46.78 t/TJ in 2008 as reported in the original submission). In addition, the ERT was informed during the review that CO_2 emissions from ammonia production were calculated using a storage factor of 33 per cent (the default factor for CO_2 emissions in the reference approach), when in fact all carbon in the natural gas used as feedstock should be assumed to be emitted (no long-term storage). During the review, Greece recalculated and resubmitted all its estimates of CO_2 emissions from ammonia production reported under the industrial processes sector and the part that was allocated to the energy sector, removing the storage factor of 33 per cent in accordance with the IPCC good practice guidance. This revision resulted in an increase in the estimate of total national emissions by 27.43 Gg CO_2 eq, or 0.02 per cent, and an EF for natural gas combustion in the chemical industry reported in CRF table 1.A(a) equal to that in other industries (56.16 t/TJ in 2008). The Party also used, for calculating its resubmitted estimates, updated AD compiled in consultation with external data providers, in order to have more accurate data on the natural gas used as feedstock for ammonia

production. The ERT noted some inconsistencies in the reported values for 2008 (see para. 41 above) and recommends that Greece recheck the values for non-energy use of natural gas reported in CRF table 1.A(d) and for ammonia and/or hydrogen production and include the relevant background information in the NIR of its next annual submission.

Nitric acid production – N_2O

58. Greece uses the default methodology from the IPCC good practice guidance to estimate N_2O emissions from nitric acid production. The previous ERT had recommended that Greece try to use measurements for this key category; however, the Party explained that, since nitric acid production is decreasing in the country, the effort may not be justified. During the review, the Party provided relevant information regarding the data sources used for the verification of plant-specific AD used to estimate these emissions. The ERT recommends that Greece include this information in its next annual submission, in order to improve transparency.

Consumption of halocarbons and SF_6 – HFCs

59. Emissions from the use of HFCs were calculated using tier 2 methods and country-specific EFs. The ERT noted that the emissions from product use were estimated using an EF (product life factor (PLF)) based on expert judgement and that the actual source (rather than the provider) of AD was not always provided. The ERT recommends that Greece provide more information on the country-specific EF used and clarify the sources of the AD used (type and quality), in particular for commercial refrigeration and mobile air-conditioning. The ERT observed a discrepancy between the PLF value for transport refrigeration reported in the NIR (12.5 per cent) and that provided in the CRF tables (10 per cent). The ERT recommends that Greece correct this error in its next annual submission.

60. The ERT observed that the PLF value of 5 per cent used for the operation of mobile air-conditioning is very low when compared with the 10–12 per cent range reported by most countries and the 10–20 per cent default range provided in the IPCC good practice guidance. The PLF value used for transport refrigeration (12.5 per cent) is also low when compared with the IPCC default range of 15–50 per cent and the range reported by other countries (15–32 per cent). The ERT noted that both values are based on expert judgment, without a clear explanation being provided for the choice. Moreover, the ERT noted that although in recent years new mobile air-conditioning appliances with an annual leakage rate significantly lower than 10 per cent have been sold, these will have only a limited market share in 2008. In response to a question raised by the ERT, Greece recalculated and resubmitted its estimates of HFC emissions for these two subcategories, using PLFs of 12 and 25 per cent, which added 413.48 Gg CO_2 eq, or 3.9 per cent, to the estimate of emissions for the sector for 2008.

3. Non-key categories

Aluminium production – PFCs

61. Greece does not report AD on aluminium production in the CRF tables, as the data are considered confidential. However, the ERT noted that data on primary aluminium production are reported to the United Nations Statistics Division and published in the United Nations Industrial Commodity Statistics (Yearbook and Database). The ERT recommends that the Party report in the CRF tables of its next annual submission publicly available data on aluminium production (e.g. from the United Nations Statistics Division or from the United States Geological Survey, referencing the data source used) to enable the assessment of the approximate level and trend of the IEFs for PFC emissions for cross-country comparison and trend analysis. The NIR should note that these figures are

estimated production data only and are not the actual production data reported by the plant. The publicly available data could be further used in order to perform additional QC procedures of the plant-specific data provided by the PFC emissions' data provider (i.e. the plant). The ERT encourages the Party to include information on the results of these QC procedures in its next annual submission.

Consumption of halocarbons and SF_6 – SF_6

62. Emissions of SF_6 from electrical equipment are reported in CRF table 2(II), but there are no further details provided in CRF table 2(II).F. The ERT noted that, although there is no manufacturer of switchgear equipment in Greece, there are emissions from installation losses for high-voltage switchgear used in the country, which should preferably be reported under emissions from manufacturing. The ERT recommends that Greece complete its reporting of these emissions in CRF table 2(II).F in order to improve transparency.

Solvent and other product use – N_2O

63. Greece recalculated its estimates of emissions from the use of N_2O for anaesthesia and from N_2O from aerosol cans. However, the NIR provides no information on the sources of the AD or on the selection of the EFs used. During the review, the Party provided relevant information, which the ERT recommends be included in the Party's next annual submission.

D. Agriculture

1. Sector overview

64. In 2008, emissions from the agriculture sector amounted to 8,918.48 Gg CO_2 eq, or 6.9 per cent of total GHG emissions. Since the base year, emissions have decreased by 21.4 per cent. The key driver for the fall in emissions is the decrease in N_2O emissions from agricultural soils, which is due to the reduction in the use of synthetic fertilizers. Within the sector, 57.0 per cent of the emissions were from agricultural soils, followed by 32.6 per cent from enteric fermentation, 8.7 per cent from manure management, 1.2 per cent from rice cultivation and 0.5 per cent from field burning of agricultural residues.

65. The inventory for the agriculture sector is complete and includes estimates for all gases and categories. The Party reported that prescribed burning of savannas does not occur in the country and the appropriate notation key is used. Estimates of direct and indirect N_2O emissions from the application of sewage sludge to agricultural soils have not been included in the NIR, but were provided by the Party during the review (see para. 74 below).

66. The inventory is generally transparent in terms of the description of the AD, methods and EFs applied. However, the ERT noted that the characterization of the sheep population is not transparently described in the NIR and that the assumptions used by experts for the allocation of animals to the different animal waste management systems (AWMS) are not provided. The ERT recommends that Greece improve the transparency of the NIR in relation to these issues in its next annual submission.

67. Greece has reported recalculations in the agriculture sector, which were due to the availability of updated data on its animal population (for enteric fermentation and manure management), and the updating of the N excretion value for goats and the quantities of synthetic fertilizers consumed (for agricultural soils). The recalculations resulted in a reduction in the estimates of total sectoral emissions for 1990 and 2007 by 2.16 and 0.02 per cent, respectively, and are documented in the CRF tables and the NIR. The revised estimates submitted by the Party during the review added 0.22 Gg CO_2 eq to the estimate of total emissions from the sector in 2008 (see para. 74 below).

68. The present ERT appreciates the efforts made by Greece in responding to the recommendations of the previous ERT, such as by correcting the average CH_4 conversion rate for sheep (enteric fermentation), improving the consistency between the CRF tables and the NIR of the average gross energy intake for sheep, and revising the N excretion value for goats. In addition, the ERT acknowledges the improved transparency of the NIR as a result of the inclusion of tables with values for gross energy and average CH_4 conversion rate, and an EF for each subcategory.

2. Key categories

Enteric fermentation – CH_4

69. For the estimation of emissions from enteric fermentation, Greece applied the IPCC tier 2 method using country-specific information for sheep and the tier 1 method with default EFs for other animals. As the emissions from cattle are significant (accounting for 41.5 per cent of the emissions from enteric fermentation), that animal category should be considered a key category, and the ERT recommends that Greece use the tier 2 method for estimating these emissions from cattle. The ERT also recommends that the Party disaggregate the emissions from enteric fermentation by the significant animal types when undertaking the key category analysis, consistent with the approach outlined in the IPCC good practice guidance.

70. The sheep classes used to characterize the population are not transparently described in the NIR. Table 6.5 of the NIR provides a breakdown of the sheep population by sex and age classes, grazing and housing conditions, milking type, wool production and births. During the review, the Party clarified that all these classes were used in the estimation of emissions, with each class used to estimate different components of the energy requirements, for example sex and age classes for the energy for maintenance; grazing and housing conditions for the energy required for activity, and milking type for lactation requirements. This approach is not consistent with the IPCC good practice guidance. The ERT noted the following issues with the outlined approach: energy for growth was estimated only for lambs and not for all growing sheep; energy for wool growth was estimated only for sheep grown for wool production rather than for all sheep; the number of milking ewes used to estimate energy for maintenance is lower than the number of animals by milking type used to estimate the energy requirements for lactation; and all births are assumed to be singles, while the number of female sheep over one year old (mature sheep) and the number of milking ewes is less than the number of births each year. The ERT recommends that Greece apply the enhanced characterization outlined in the IPCC good practice guidance, in which the population is broken down by age and sex classes and for each of these classes the number/proportion in each grazing/housing condition, milking and wool production type is identified. To ensure the accuracy of the results, the ERT also recommends that the Party undertake category-specific QC checks, such as those outlined in the IPCC good practice guidance.

Agricultural soils – N_2O

71. Greece estimated N_2O emissions from agricultural soils using the tier 1a and 1b methods from the IPCC good practice guidance in combination with country-specific and IPCC default data.

72. Greece combined country-specific data (for dairy cattle, non-dairy cattle, buffalo and swine) and default data from the Revised 1996 IPCC Guidelines (for sheep, goats, horses, mules and poultry) on the allocation of manure to AWMS for the estimation of N_2O emissions from agricultural soils and manure management. The NIR does not provide a clear description of the way in which the country-specific data were developed or chosen.

The present ERT reiterates the recommendation of the previous ERT that Greece improve the documentation and justification of country-specific data and provide the basic information supporting the experts' opinions used for defining the EF in its next annual submission.

73. The two previous ERTs noted that Greece had used the default N excretion (Nex) values for cattle (70 kg/head/year for dairy and 50 kg/head/year for non-dairy) for the Mediterranean, while the dairy milk production has increased to levels similar to those of Western Europe. The previous ERT recommended that the Party either provide a justification for this choice or use the defaults for Western Europe. The previous ERT also recommended that Greece investigate the possibility of developing country-specific Nex values. The present ERT reiterates those recommendations.

74. The ERT identified that Greece did not estimate the direct and indirect N_2O emissions associated with the use of sewage sludge on agricultural soils. Data to estimate emissions from this category are available from data collected under the EU sewage sludge directive (86/278/EEC). During the review, the Party submitted estimates of emissions from this category for the period 2004–2008 and provided the ERT with information on the data used and the method applied. The ERT concluded that the estimates are acceptable and transparently documented. The ERT recommends that Greece include the relevant methodological information and justifications in the NIR of its next annual submission.

3. Non-key categories

Manure management – CH_4 and N_2O

75. Greece used the enhanced characterization of the sheep population for estimating CH_4 emissions from enteric fermentation for sheep. However, this level of characterization is not maintained when estimating CH_4 and N_2O emissions from manure management for sheep, as recommended in the IPCC good practice guidance. The ERT recommends that Greece use a single characterization for sheep for estimating emissions for all relevant categories under the agriculture sector in its next annual submission.

E. Land use, land-use change and forestry

1. Sector overview

76. In 2008, net removals from the LULUCF sector amounted to 3,176.18 Gg CO_2 eq. Since 1990, net removals have increased by 28.2 per cent. The key drivers for the rise in removals are the reduction in fellings and the afforestation programme launched in 1994. Within the sector, 74.5 per cent of the net removals were from forest land (2,395.45 Gg CO_2 eq) and 25.2 per cent from cropland (801.12 Gg CO_2 eq); net emissions came from grassland (13.37 Gg CO_2 eq), settlements (1.05 Gg CO_2 eq) and other land (5.96 Gg CO_2 eq).

77. Greece reports estimates of net CO_2 emissions/removals for all land-use categories. However, the following subcategories are reported as "NE": grassland converted to forest land; cropland, settlements and other land converted to wetlands; and cropland converted to settlements. CO_2 emissions from living biomass on forest land converted to wetlands are reported for 1996 and the period 2001–2007, and are reported as not occurring ("NO") for the other years of the time series. For 2008, although an area of 0.08 kha is reported as forest land converted to wetlands, CO_2 losses in living biomass are reported as "NO". Greece explains that these losses have not been estimated due to a lack of sufficient data, but assumes that they are expected to be relatively small since the area flooded after 1990 is small. The ERT recommends that Greece present further information (in the documentation

boxes and in the NIR) on the subcategories for which it presents AD without reporting emissions. The ERT noted that, despite the improvements made to enhance the completeness of its inventory, Greece still needs to develop estimates for some missing subcategories and pools, including dead organic matter, and urges the Party to strive for completeness in its next annual submission. Since Greece reports many subcategories and pools using the notation key "NO", the ERT recommends that the Party include in the documentation boxes references to where in the NIR information is provided about these subcategories and pools.

78. In its 2010 submission, for the identification of land use and land-use changes Greece used the newly developed databases within MEECC for areas of land-use change and for managed forests (the Forest Management Plan Database). Furthermore, the Party indicated that it is developing a new mapping system based on remotely sensed data, which will enable it to provide more complete information on land-use changes.

79. Greece applies methodological approaches to estimate changes in carbon stock and GHG emissions/removals following the IPCC good practice guidance for LULUCF. Greece continues to use predominantly IPCC default EFs for the most relevant land-use categories (forest land, cropland and grassland) for all reported gases. The ERT reinforces how important it is for Greece to ensure more accurate inventory estimates, as required for key categories, and recommends that Greece seek to provide country-specific parameters (e.g. biomass expansion factor and basic wood density) in its next annual submission.

80. The ERT noted the need for the Party to further increase transparency in its reporting on LULUCF, in particular owing to the change in methodological approach for forest land remaining forest land (from the default flux method to the carbon stock change method) and in the definition of forest introduced in the 2010 submission. This includes providing transparent information on, inter alia, time-series consistency, data availability and quality, type and sources of data included in the Forest Management Plan Database, and AD and EFs for cropland and grassland.

81. The recalculations reported for the sector were due to: changes in the definitions of forest and managed forest; the implementation of the carbon stock change method to estimate CO_2 emissions and removals from forest land remaining forest land; the availability of revised AD for cropland; and the estimation, for the first time, of emissions and removals from transitions between land-use categories (forest land, grassland and other land to other land-use categories). As a result of the recalculations, the Party's net removals in 1990 and 2007 decreased by 22.4 per cent and 17.1 per cent, respectively. The NIR does not contain adequate information to explain the significant recalculations of the time series of estimates for forest land. The ERT recommends that Greece provide more detailed information on how the recalculations have been carried out in its next annual submission.

82. The present ERT noted that some of the recommendations of previous ERTs in relation to the LULUCF sector were implemented, such as improving the completeness of the LULUCF inventory. Additionally, the switch from the gain-loss method to the carbon stock change method to estimate changes in carbon stock in biomass should address the recommendation that Greece estimate changes in carbon stock due to biomass burning and also use more up-to-date data. Although this new method helps to address some of the previous recommendations, it also creates other issues, such as the inability to distinguish between the gains and losses associated with the changes in carbon stock.

2. Key categories

Forest land remaining forest land – CO_2

83. In its 2010 submission, Greece changed the definitions of forest and managed forest using the same definition of forest under the Convention and the Kyoto Protocol. As a result, the total area of forest land remaining forest land in 2007 changed from 6,513.07 kha to 3,356.04 kha, a decrease of 48.5 per cent. During the review, Greece clarified that changing the thresholds in the definition of forest resulted in the reallocation of 3,157.03 kha of forest land in the 2009 submission to grassland in the 2010 submission. The forest definition used in the 2010 submission includes a minimum tree height of 2 m and the minimum crown cover has been increased from 10 to 25 per cent. Greece does not provide in the NIR any information on the impact of this change in the forest definition on the data sources used for the inventory, and the ERT urges the Party to provide this information in its next annual submission.

84. Greece defines managed forests as those that have been managed under a forest management plan since 1990. Information on the units of land under forest management is provided in the Forest Management Plan Database, developed by MEECC. The ERT encourages the Party to include more detail on the type of data included in the Forest Management Plan Database in its next annual submission. During the review, Greece explained that changing the definition of managed forest resulted in 2,181.43 kha of forest land being reallocated to unmanaged forest, and, as a result, emissions/removals were no longer estimated for these lands. The NIR states that the changes in the forest and managed forest definitions were introduced in order to increase the accuracy of the estimates and to ensure consistency with the Kyoto Protocol inventory. According to the IPCC good practice guidance for LULUCF, managed forest fulfils not only production but also ecological and social functions. The ERT noted that the definition now applied by Greece could be too narrow an interpretation of managed forest land and that it could lead to an underestimation of emissions/removals, as ongoing anthropogenic changes in carbon stock in forests only managed under forest management plans prior to 1990 are not considered in the reporting. In the light of the concerns expressed by it, the ERT strongly recommends that Greece review and revise the definition of managed forest land used for its reporting under the Convention, or demonstrate that no anthropogenic emissions and removals occur on unmanaged forest land (e.g. fires or regrowth from pre-1990 harvesting). The ERT also recommends that unmanaged forest lands be reported as a subcategory of forest land remaining forest land in the CRF tables in future submissions, in order to increase the transparency and completeness of the reporting.

85. In its 2010 submission, Greece also changed the estimation methodology, from the IPCC default method based on biomass carbon gains and losses to the stock change method, which requires carbon stock inventories at two points in time. During the review, Greece explained the change with the search of more up-to-date data sources that also comply with the requirements of the reporting under the Kyoto Protocol. The ERT noted that the use of the stock change method does not always provide good results for forests of mixed stands, and/or where the change in biomass stock is very low compared with the total amount of biomass, which seemed to be the case in Greece. However, the Party clarified during the review that the carbon stock change method had been used at the district level, at which larger changes in biomass stocks occur (relative to those at the national level) and accurate inventories are prepared. The ERT recommends that the Party include this information in its future annual submissions, as well as any other relevant information, to enable a fair assessment by the ERT of the adequacy of the methodological change introduced in 2010.

Cropland remaining cropland – CO_2

86. Greece reports emissions from mineral soils for cropland remaining cropland, but notes that emissions from cropland converted to grassland and to forest land are also reported in this subcategory, owing to the use of approach 1 for land representation and the impossibility of allocating converted land area to any specific land-use category. However, as noted in previous review reports, the ERT considers that, as areas of land-use conversion are estimated and default EFs are used, it is possible to allocate the soil carbon stock changes to the appropriate land-use categories. As Greece has indicated that its new mapping system will provide complete and up-to-date estimates for all land uses and land-use changes for its 2011 submission (rescheduled to 2012 during the review), the ERT strongly recommends that Greece report the changes in soil carbon stock in the appropriate subcategories. The ERT also encourages the Party to adopt approach 2 or ideally approach 3 for land representation, in order to improve the accuracy of its estimates for all categories.

3. Non-key categories

Grassland – CO_2, CH_4 and N_2O

87. As a result of the new definition of forest adopted by Greece, a large portion of land previously identified as forest land has now been allocated to grassland. The Party does not provide sufficient information in the NIR to allow the ERT to evaluate the effect of this land reallocation on the average biomass stock in grassland, which would be expected to increase. Although Greece already stratifies grassland into two subcategories (herbaceous and woody vegetation), the ERT strongly recommends that Greece verify that the average carbon stock in living biomass in lands previously defined as forest land and reallocated to grassland falls within the values provided (2.2 t dry matter/ha for herbaceous vegetation and 8 t dry matter/ha for woody vegetation) to increase the accuracy of the estimates. The ERT recommends that the Party demonstrate in a transparent way, in its next NIR, that the carbon stock in the forest land reallocated to grassland will not exceed the carbon stock assumed for grassland woody vegetation. The ERT also recommends that the Party derive country-specific biomass values for the different grassland types, as recommended in the IPCC good practice guidance for LULUCF.

Biomass burning – CH_4 and N_2O

88. The ERT recommends that Greece transparently demonstrate that unmanaged grassland is also monitored so that emissions can be reported in the case that a land-use conversion occurs following, for example, a fire.

89. Greece reports non-CO_2 emissions from biomass burning on managed forest land and assumes that part of the biomass is lost and part is transferred to dead organic matter. The ERT noted that Greece does not include in its NIR information on how it monitors unmanaged forest affected by, for example, fires to ensure that no land-use change occurs, in which case emissions from these lands would have to be reported. The ERT recommends that the Party include such information or relevant estimates in its next annual submission.

F. Waste

1. Sector overview

90. In 2008, emissions from the waste sector amounted to 3,886.07 Gg CO_2 eq, or 3.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 25.4 per cent. The key drivers for the fall in emissions are the implemented management policies and measures in the country, the increase in the aerobic treatment of wastewater and the

reduction of unmanaged SWDS. Within the sector, 58.8 per cent of the emissions were from solid waste disposal on land, followed by 41.8 per cent from wastewater handling and 0.1 per cent from waste incineration.

91. The inventory for the waste sector is generally complete. CH_4 emissions from the treatment of industrial sludge were reported as "NE", but, during the review, Greece provided emission estimates for this subcategory (see para. 100 below). Greece also reported as "NE" N_2O emissions from industrial, domestic and commercial wastewater and sludge, for which there are no IPCC methods available to estimate emissions.

92. The transparency of the NIR has been improved, in response to recommendations of previous ERTs. Information is now provided on implemented category-specific tier 2 QC procedures. However, the ERT noted that there are still issues of transparency in relation to the explanation and justification of underlying assumptions used for estimations of AD, particularly related to information provided by different research studies and programmes.

93. Greece has reported recalculations in the waste sector for the entire time series. Changing the oxidation factor from 0 to 0.1 for managed SWDS led to the most significant recalculations. Another reason for recalculations was the update of the AD for commercial wastewater handling. These changes led to the recalculation of the estimates of CH_4 emissions from solid waste disposal on land and from commercial wastewater handling as well as of CH_4 and N_2O emissions from waste incineration. The recalculations resulted in a decrease in the estimate of sectoral emissions by 0.2 and 4.8 per cent in 1990 and 2007, respectively. The revised estimates submitted by the Party during the review added 916.60 Gg CO_2 eq, or 30.9 per cent, to the estimate of total emissions from the sector in 2008 (see para. 100 below).

94. The present ERT noted that Greece has addressed most of the recommendations of the previous ERT, namely it has: included estimates of CH_4 and N_2O emissions from clinical waste incineration; reallocated emissions between the waste and energy sectors; revised the oxidation factor used for managed SWDS; improved transparency by reporting some background information (e.g. degradable organic carbon (DOC) and DOC dissimilated (DOC_f) for sludge). However, there are recommendations of the previous ERT that have not been addressed by the Party, such as the unchanged uncertainty values from the 2008 submission, which are reiterated in the relevant category chapters below.

2. Key categories

Solid waste disposal on land – CH_4

95. Greece has applied the IPCC first order decay method (tier 2) to estimate CH_4 emissions from solid waste disposal on land. The parameters used for the estimation of emissions are mainly IPCC default values. Historical data on amounts and composition of waste in the period 1960–2000 are based on a combination of assumptions and research studies, of which the ERT recommends better documentation in the NIR. AD for the most recent years of the time series are provided by MEECC. The amount of waste generated is calculated on the basis of the waste generation rate per capita, which has gradually decreased over time (from 0.035 kg/capita/day in 1990 down to 0.028 kg/capita/day in 2008).

96. Accurate data on the composition of municipal solid waste are not available at the national level. For example, garden and park waste as well as other non-food putrescibles have been included in the general putrescibles category. As the DOC value of these waste types differs, their allocation to the same category is not in line with the Revised 1996 IPCC Guidelines. The ERT reiterates the recommendation made in the previous review report that Greece estimate these waste types separately using appropriate DOC values.

97. Landfill gas is collected and flared on major managed SWDS. It is only on the Athens waste disposal site, which handles approximately 50 per cent of the total municipal solid waste disposed in Greece, that landfill gas is utilized for energy purposes, and the emissions are reported under the energy sector in line with the IPCC requirements.

98. As the methane correction factor (MCF) and other parameters used for estimating emissions differ between unmanaged and uncategorized SWDS, Greece's allocation of all unmanaged SWDS to uncategorized is not in line with the IPCC good practice guidance. The ERT reiterates the recommendation made in the previous review report that Greece break down the unmanaged sites into the different IPCC categories, apply the appropriate CH_4 correction factors and recalculate the corresponding time series. The previous ERT also recommended that the DOC_f value be revised; however, in the 2010 submission the DOC_f remains at 0.77, which is higher than the default of 0.5 recommended in the IPCC good practice guidance. The value used by Greece is not adequately explained or justified in the NIR, which is not in accordance with the IPCC good practice guidance. The NIR states that Greece will change this value once a country-specific value has been estimated. The ERT recommends that, in the meantime, Greece recalculate its emission estimates applying the default DOC_f value suggested in the IPCC good practice guidance.

Wastewater handling – CH_4

99. The IPCC default methodology (tier 1) was used to estimate CH_4 emissions from municipal, commercial and industrial wastewater handling. The previous ERT recommended that Greece move to tier 2 methods to estimate emissions for this key category. In response, Greece has indicated in the NIR that the use of a higher-tier methodology is not possible at the moment, owing to the lack of the required AD. The ERT encourages the Party to further explore the possibility of applying a higher-tier methodology.

100. CH_4 emissions from the treatment of industrial sludge were reported as "NE". During the review, Greece provided emission estimates for this category for the entire time series (916.60 Gg CO_2 eq in 2008) based on expert judgement. The ERT commends the Party for this improvement and recommends that Greece include the relevant methodological explanations in its next annual submission. The ERT reiterates the recommendation made in the previous review report that Greece provide additional information regarding the country's wastewater and sludge treatment systems (aerobic, anaerobic, treated and untreated).

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

101. CO_2, CH_4 and N_2O emissions from incineration of hospital waste in the Attica region were estimated for the first time for the Party's 2010 submission. The IPCC default method and country-specific EFs were applied. The ERT commends Greece for this improvement in the completeness of its inventory and encourages the Party to collect data on the amounts of waste incinerated in other medical institutions as well as to provide information on whether the incineration of other waste of fossil origin without energy recovery occurs in Greece.

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

102. Greece provided information related to KP-LULUCF following the annotated NIR,[7] providing general, land-specific and activity-specific information in line with the requirements of the annex to decision 15/CMP.1.

103. The Party reported activities under Article 3, paragraph 3, of the Kyoto Protocol and reported forest management, which it has elected under Article 3, paragraph 4, of the Kyoto Protocol. Greece has elected to account for the KP-LULUCF activities at the end of the commitment period. Greece defines forest land as land with a tree crown cover of more than 25 per cent, an area larger than 0.3 ha and a minimum tree height, or the potential to achieve it, of 2 m. This forest definition is the same as that used in the Party's reporting under the Convention starting from its 2010 submission.

104. Greece applies reporting method 1 from the IPCC good practice guidance to report activities under Article 3, paragraphs 3 and 4, with the boundaries of the areas that encompass these activities defined as the 51 prefectures of the country. The Party presents a land-use transition matrix for 2008 based on several data sources. The data on afforestation and reforestation originate from the afforestation registry of MEECC and encompass afforestation activities on cropland since 1994. The ERT recommends that Greece provide information on how afforestation and reforestation since 1990 are identified under its national system. Additionally, since the afforestation registry covers only afforestation on cropland, the ERT recommends that Greece provide information on possible afforestation and reforestation under other land categories (e.g. grassland) to improve the accuracy of the estimates for land converted to forest land. Data on deforestation are obtained from the Party's Land-use Change Database, which includes data on changes from forest land to other land-use categories since 1990 collected by the local Forest Services. The ERT recommends that Greece present in its next annual submission information on: how consistency is ensured between the data collected by different local Forest Services; the QA/QC implemented; and the method used to identify land-use changes for the database. Data on units of land under forest management originate from the Party's Forest Management Plan Database. The ERT noted that the Party did not provide transparent information regarding the consistency of these data sources with the actual land-category definitions adopted by the Party. The ERT recommends that Greece provide this information in its next annual submission. The ERT also recommends that Greece present the area and change in area for each land category using the new mapping system to be launched in 2011, and evaluate the difference in the results from the old and new systems.

105. Greece applies methods consistent with the IPCC good practice guidance for LULUCF to estimate changes in carbon stock as a result of afforestation and reforestation, deforestation and forest management, using country-specific AD and mostly default EFs from the IPCC good practice guidance. The Party indicated in the NIR that it is planning to produce country-specific EFs (for living biomass) for the key category land converted to forest land. The ERT noted that in its 2010 submission Greece did not provide sufficient verifiable information, as required by paragraph 6(e) of the annex to decision 15/CMP.1, to demonstrate that omitted pools, namely litter, dead wood and soils, are not net sources of

[7] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

emissions. The ERT recommends that the Party provide this mandatory information or include relevant estimates, as appropriate, in its next annual submission.

106. Greece has conducted both a key category and an uncertainty analysis for the KP-LULUCF activities.

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

Afforestation and reforestation – CO_2

107. AD on afforestation and reforestation are disaggregated into 24 forest types, and the EFs used (average net annual increment, wood density, biomass expansion factor, root-to-shoot ration and annual above-ground biomass increment) are the default values from the IPCC good practice guidance for LULUCF. Loss of carbon stock from afforestation and reforestation is not reported, since lands afforested since 1994 have not yet been harvested. The ERT noted that, since Greece includes data on afforestation and reforestation since 1994 only, deforestation or losses of carbon stock on the lands subject to afforestation and reforestation occurring between 1990 and 1994 are not reported, leading to a potential underestimation of the changes in carbon stock in these lands. The ERT recommends that Greece include in its next annual submission data on all lands subject to afforestation and reforestation since 1990, in order to improve the accuracy of its estimates for afforestation and reforestation.

Deforestation – CO_2

108. Data on deforestation have not been reported for 10 out of the country's 51 prefectures. The Party explained that the missing information will be provided in its next annual submission. The ERT noted that the inability to identify deforested lands in these prefectures could result in an underestimation of the total area of deforested land. The ERT strongly recommends that Greece ensure the necessary capacity within the local Forest Services to acquire and report these data in accordance with the requirements of paragraph 20 of the annex to decision 16/CMP.1.

109. The methodologies used for estimating carbon stock changes in and GHG emissions from deforested lands are the same as those used for the reporting on LULUCF under the Convention. The estimates are consistent with those for the subcategories of forest land converted to any other land category under the Convention. For forest land converted to settlements, the Party does not estimate emissions from dead organic matter or soil. The ERT recommends that the Party provide these estimates in its next annual submission, in order to improve completeness. The Party uses country-specific AD and default EFs from the IPCC good practice guidance for LULUCF for its estimations. The ERT recommends that the Party generate country-specific EFs, in order to improve the accuracy of its inventory.

110. The Party indicates that only legal deforestation is included in its Land-use Change Database, assuming that lands that have illegally lost their forest cover are only temporarily unstocked, with vegetation recovering naturally or as a result of human intervention. Thus, harvesting or disturbance in these areas are not considered deforestation. The ERT noted that this approach may lead to an underestimation of deforestation and that Greece has information on the size and geographical location of areas that have lost forest cover through illegal harvest or biomass burning, but that these are not readily available for use under the scope of the Kyoto Protocol inventory. The ERT strongly recommends that the Party report on all forest land that has legally or illegally lost its original forest cover. The ERT also recommends that the Party provide information on how it tracks the areas that are temporarily destocked to ensure reporting of all forest land converted to other land categories.

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

Forest management – CO_2

111. The estimates of CO_2 emissions/removals from forest management are equivalent to those reported for the subcategory forest land remaining forest land under the Convention (CRF table 5.A). The methodologies used are consistent with those contained in the IPCC good practice guidance for LULUCF. In order to improve transparency, the ERT recommends that the Party include in its next annual submission a clarification on its Forest Management Database to ensure that only activities implemented since 1990 are included as lands under forest management under Article 3, paragraph 4, of the Kyoto Protocol.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

112. Greece 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.[8] 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.

113. 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 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. No discrepancy has been identified by the ITL and no non-replacement has occurred.

National registry

114. 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 took note of 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. However, on the basis of a recommendation made in the SIAR, the ERT recommends that Greece further improve the publicly available information by providing that information not only in Greek but also translated into English and that mistakes (e.g. wrong Party name, or no reporting of units retired during the reported year) detailed in the SIAR are also corrected before its next annual submission. The ERT recommends that Greece address these problems and report the results in its next annual submission.

Calculation of the commitment period reserve

115. Greece has reported its commitment period reserve in its 2010 annual submission. Greece reported that its commitment period reserve has not changed since the initial report

[8] 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.

review (601,802,826 t CO_2 eq), as it is based on the assigned amount and not on the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

116. Greece reported that there have been changes in its national system since its previous annual submission. These changes were linked to establishing new ministries in October 2009 and setting the responsibilities of those ministries by Presidential Decree No 189, dated 5 November 2009, and concern mainly the names and the roles of the ministries involved. The new MEECC retains the responsibility for the inventory of the former Ministry of Environment, Physical Planning and Public Works and incorporates the General Directorate of Energy and Natural Resources (previously belonging to the Ministry of Development) and the General Directorate for the Development and Protection of Forest and Natural Environment (previously belonging to the Ministry of Rural Development and Food), thus bringing together the main providers of the inventory data. The ERT concluded that, taking into account the confirmed changes in the national system, Greece'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

117. Greece reported that there have been no changes in its national registry since the previous annual submission. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

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

119. The reported information is considered complete and transparent.

120. The Party explained that the majority of Greek policies are directly related to the implementation of EU policies at the national level and that impacts on third countries are mostly indirect. Greece provides transparent information on the considerations related to the implementation of its commitments related to Article 3, paragraph 14, in the context of the EU directive on the promotion of the use of renewable energy (2009/28/EC) and the EU directive concerning the extension of the EU ETS to include the aviation sector (2008/101/EC), as these directives have been identified as having a potential impact on third countries. The ERT considers this information complete given the relevance of the EU policies considered.

121. Greece has included a separate section in its NIR with information on how it gives priority, in implementing its commitments under Article 3, paragraph 14, to the specific actions listed in paragraph 24 (a–f) of the annex to decision 15/CMP.1.

III. Conclusions and recommendations

122. Greece made its annual submission on 15 April 2010. The annual submission contains the GHG inventory (comprising the 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 minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

123. The ERT concludes that the inventory submission of Greece has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is generally complete and the Party has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are generally complete in terms of geographical coverage, years and sectors, as well as complete in terms of categories and gases. Originally, Greece did not report CO_2 emissions from limestone and dolomite use for magnesia production, N_2O emissions from the application of sludge to agricultural soils, CH_4 emissions from the sludge of industrial wastewater, and emissions of some F-gases, but the relevant estimates were provided during the review. The Party does not report emission estimates for some mandatory subcategories in the LULUCF sector.

124. 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.

125. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, with the following exceptions: the reporting of fuels in the reference approach (e.g. excluding fuel used for international aviation and fuels used as feedstock in industrial processes); the allocation of garden and park waste as well as other non-food putrescibles in the general putrescibles category; the allocation of all unmanaged SWDS to uncategorized SWDS; and the use of a new definition of forest land under the Convention according to which only those lands under a forest management plan since 1990 are considered managed.

126. Greece has elected to account for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period. The Party follows the requirements of paragraphs 5 to 9 of the annex to decision 15/CMP.1. The KP-LULUCF inventory has been prepared in line with the IPCC good practice guidance for LULUCF. The following issues were identified concerning the reporting on KP-LULUCF: the reporting on units of land subject to afforestation and reforestation since 1994 only; the reporting on legal deforestation only; the fact that no data on deforestation were provided for 10 out of the country's 51 prefectures, owing to a lack of data.

127. Greece 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.

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

129. 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 decisions of the CMP.

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

131. In the course of the review, the ERT formulated a number of recommendations relating to the methodological choices, national system, transparency and completeness of

the information presented in Greece's annual submission. The key recommendations are that Greece:

(a) Address the recommendations of previous ERTs that have not yet been addressed;

(b) Further improve and strengthen the national system, in particular with respect to LULUCF;

(c) Improve the key category analysis by using a finer disaggregation of categories and addressing the categories with very high uncertainties;

(d) Improve the implementation and coverage of its QA/QC activities;

(e) Further improve the transparency of the explanation/justification of its QA/QC procedures for the data supplied by external sources and of applied country-specific methodologies, data, EFs and parameters;

(f) Provide transparent and comprehensive information on all recalculations;

(g) Ensure consistency between the amounts of liquid and gaseous fuels used as feedstock and allocated under the industrial processes sector and the amounts reported in CRF table 1.A(d);

(h) Provide detailed information (e.g. in an annex to the NIR) on the EU ETS data used, including an analysis of the completeness of the data and consistency of the estimates with the IPCC methodology, and on the verification procedure applied to ensure conservation of the fuel mass balance and completeness of the data;

(i) Apply the enhanced livestock characterization for sheep for the estimation of emissions from enteric fermentation, as outlined in the IPCC good practice guidance;

(j) Break down the unmanaged SWDS into the different IPCC categories and apply the default IPCC DOC_f value for estimating emissions until country-specific values are available;

(k) Develop estimates for currently not-estimated LULUCF subcategories and pools, including for non-mandatory categories for which it has previously provided estimates;

(l) Review and revise the definition of managed forest used for its reporting under the Convention or demonstrate that no anthropogenic emissions and removals occur on unmanaged forest land (e.g. fires or regrowth from pre-1990 harvesting);

(m) Demonstrate, in the next submission, that the carbon stock in the forest land reallocated to grassland will not exceed the carbon stock assumed for grassland woody vegetation;

(n) Provide further information that demonstrates that the national system is able to identify areas of land subject to activities under Article 3, paragraph 3, of the Kyoto Protocol in accordance with the requirements of paragraph 20 of the annex to decision 16/CMP.1;

(o) Provide further verifiable information, as required by paragraph 6(e) of the annex to decision 15/CMP.1, to demonstrate that any omitted pools are not a net source of emissions, or include the relevant estimates, as appropriate;

(p) Improve the publicly available information of the national registry by providing the information in both Greek and English, and correct the mistakes detailed in the SIAR before its next annual submission.

IV. Questions of implementation

132. 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 Greece 2010.
Available at <http://unfccc.int/resource/docs/2010/asr/grc.pdf>.

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

FCCC/ARR/2009/GRC. Report of the individual review of the annual submission of Greece submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/arr/grc.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 Ms. Afroditi Kotidou (Ministry of Environment, Energy and Climate Change) and Mr. Ioannis Sempos (National Technical University of Athens), including additional material on the methodologies and assumptions used.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOC	degradable organic carbon
DOC_f	degradable organic carbon dissimilated
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 land use, land-use change and forestry
HCFC-22	hydrochlorofluorocarbon-22
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
NA	not applicable
NCVs	net calorific values
NE	not estimated
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
PLF	product life factor
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SWDS	solid waste disposal sites
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change