UNITED
NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/ARR/2009/GRC
8 February 2010

ENGLISH ONLY

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

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

GE.10-60147

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Greece, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 21 to 26 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Kristina Saarinen (Finland) and Mr. Marius Ţăranu (Republic of Moldova); energy – Mr. Pascal Bellavance (Canada), Mr. Tomas Gustafsson (Sweden) and Mr. Benon Bibbu Yassin (Malawi); industrial processes – Mr. Afshin Matin (Canada) and Ms. Suvi Monni (European Community); agriculture – Mr. Leonard Brown (New Zealand) and Ms. Hongmin Dong (China); land use, land-use change and forestry (LULUCF) – Ms. Tracy Johns (United States of America) and Mr. Harry Vreuls (Netherlands); and waste – Ms. Maryna Bereznytska (Ukraine) and Mr. Carlos Lopez (Cuba). Mr. Brown and Mr. Ţăranu were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), a draft version of this report was communicated to the Government of 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 2007, the main greenhouse gas (GHG) in Greece was carbon dioxide (CO_2), accounting for 86.1 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by nitrous oxide (N_2O) (7.1 per cent) and methane (CH_4) (6.2 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.6 per cent of the overall GHG emissions in the country. The energy sector accounted for 82.0 per cent of total GHG emissions, followed by agriculture (8.6 per cent), industrial processes (6.9 per cent), waste (2.4 per cent) and solvent and other product use (0.1 per cent). Total GHG emissions amounted to 131,853.83 Gg CO_2 eq in 2007 and increased by 22.4 per cent between the base year[2] and 2007, and by 24.9 per cent between 1990 and 2007.

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

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of 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 includes emissions from Annex A sources only.

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

Greenhouse gas	Gg CO_2 eq							Change base year–2007 (%)
	Base year[b]	1990	1995	2000	2005	2006	2007	
CO_2	83 150.00	83 150.00	86 751.70	103 439.41	111 046.80	109 624.74	113 565.83	36.5
CH_4	9 003.69	9 003.69	9 058.47	8 933.98	8 146.27	8 127.90	8 128.08	–9.7
N_2O	12 212.74	12 212.74	11 033.25	10 781.79	9 931.72	9 660.20	9 425.77	–22.8
HFCs	3 254.21	935.06	3 254.21	3 818.72	2 628.43	596.65	665.57	–79.5
PFCs	82.97	257.62	82.97	148.38	71.31	71.16	58.66	–29.3
SF_6	3.59	3.07	3.59	3.99	6.45	8.37	9.92	176.7

Abbreviation: NA = not applicable.

[a] "Total greenhouse gas emissions" includes emissions from Annex A sources only (exclude emissions/removals from the LULUCF sector).

[b] "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 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO_2 eq							Change base year–2007 (%)
	Base year [a]	1990	1995	2000	2005	2006	2007	
Energy	78 388.35	78 388.35	81 701.05	98 175.53	105 433.71	104 034.76	108 108.83	37.9
Industrial processes	11 201.01	9 055.99	11 392.90	12 559.74	11 422.58	9 165.49	9 099.71	–18.8
Solvent and other product use	169.71	169.71	154.65	157.33	157.70	159.64	160.34	–5.5
Agriculture	13 497.16	13 497.16	12 546.92	12 258.07	11 632.44	11 476.22	11 297.76	–16.3
LULUCF	NA	–3 193.27	–4 368.69	–2 453.13	–4 993.74	–5 074.53	–3 650.78	NA
Waste	4 450.97	4 450.97	4 388.68	3 975.59	3 184.55	3 252.90	3 187.19	–28.4
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	**NA**	**102 368.91**	**105 815.50**	**124 673.13**	**126 837.23**	**123 014.48**	**128 203.06**	**NA**
Total (without LULUCF)	**107 707.18**	**105 562.18**	**110 184.19**	**127 126.27**	**131 830.97**	**128 089.01**	**131 853.83**	**22.4**

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

[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for 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.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 14 April 2009; it contains a set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). Greece also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including: information on accounting of Kyoto Protocol units, information on changes in the national system and in the national registry. The standard electronic format (SEF) tables were submitted on 20 March 2009. The annual submission was submitted in accordance with decision 15/CMP.1. Greece indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. Where necessary, the expert review team (ERT) also used the previous years' submissions during the review. In addition, the ERT used the standard independent assessment report (SIAR) to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

7. During the review, Greece provided the ERT with additional information. In response to a question raised by the ERT during the review, Greece also provided information on the completeness of its annual inventory submission (see para. 10 below) on 2 October 2009. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

8. The inventory covers all sectors and most source and sink categories, and is complete in terms of years, gases and geographical coverage. Greece has provided an NIR based on the structure in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), and submitted CRF tables for all years of the inventory time series. However, CRF table 7 (key category analysis) has been provided only for 2007. The ERT encourages Greece to explore the possibility of reporting CRF table 7 for all years of the time series in its next annual submission.

9. Greece provided explanations for reporting categories as not estimated ("NE") in the NIR (chapter 1, section 1.8. "Completeness", as well as in the sectoral chapters and in annex 6 "Assessment of completeness"). The ERT recommends that Greece improve the completeness of its next annual submission, especially for those categories that are known to occur within the Party and for which methodologies are available in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) to estimate emissions. The ERT encourages the Party to explore approaches available in the scientific literature, to estimate emissions for categories that do not have methodologies prescribed in the Revised 1996 IPCC guidelines nor the IPCC good practice guidance, with a view to enhance further, to the extent possible, the completeness and accuracy of its inventory. The ERT also recommends that the Party, when reporting

[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 administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

emissions data for the first time for a given category, ensure that emissions data are provided for the entire inventory time series, and that the choice of methods and EFs are clearly explained in the NIR.

10. In response to the recommendation of the ERT, the Party indicated that it would address the completeness of its inventory in its next annual submission in regards to the actual emissions of HFCs and PFCs from foam blowing, fire extinguishers and solvents, PFC emissions from aerosols/metered dose inhalers and HFCs from manufacturing of aerosols/metered dose inhalers. Greece also provided information on the steps undertaken to collect the necessary data for inclusion of those estimates in its next annual submission.

D. Main findings

11. The inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), with minor deviations in the allocation of emissions and time-series consistency and inappropriate use of methodologies (tiers) as required by the IPCC good practice guidance.

12. The 2009 inventory submission shows significant improvement on the 2008 submission. Greece has focused on determining country-specific emission factors (EFs), moving to higher tier methodologies, improving the transparency of the NIR by providing more thorough descriptions of background data and methods used to calculate GHG emissions, providing information on completeness in an annex to the NIR, and developing an inventory improvement plan. Most of the improvements were based on the recommendations of previous reviews (see para. 36 below).

13. Greece has submitted, in part, on a voluntary basis the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with section I of the annex to decision 15/CMP.1. Greece did not report on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (hereinafter referred to as the KP-LULUCF) and information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

14. The Party has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the SEF tables as required by decision 14/CMP.1. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. 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 Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

16. In the course of the review, the ERT formulated a number of recommendations relating to completeness, transparency, methodological choices, uncertainty analysis, recalculations, information on quality assessment/quality control (QA/QC) and information required under Article 7, paragraph 1 (see para. 40 below), as well as category-specific recommendations as provided in the appropriate chapters of this report.

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

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

1. Overview

17. The ERT concluded that the national system continued to perform its required functions. The institutional, legal and procedural arrangements within the national system are formalized in the ministerial circular No 918/21-4-08 "Structure and operation of the National Greenhouse Gases Inventory System - Roles and Responsibilities". The Ministry for the Environment, Physical Planning and Public Works (MINENV) through its Climate Team is responsible for the institutional, legal and procedural arrangements for the national system and the strategic development of the national inventory. MINENV also maintains the centralized inventory file (archive), administers the national registry and supervises the QA/QC system. The National Technical University of Athens (NTUA) / School of Chemical Engineering (SCE) has the technical and scientific responsibility for compiling the inventory. Other agencies and organizations (the Ministry of Rural Development and Food through its Directorate General for Development and Protection of Forests and Natural Environment, the Ministry of Development through its Energy Policy, Petroleum Policy and Renewable Energy Sources and Energy Conservation Divisions, the Ministry of Economy and Finance through its National Statistical Service of Greece (NSSG), the Ministry of Transport and Communications through its Civil Aviation Organization, the Association of Motor Vehicles Importers and various industrial associations) are also involved in the preparation of the inventory, mainly through providing data and contributing to methodological issues. A project was launched in 2009 by the Ministry of Rural Development and Food through the National Agricultural Research Foundation regarding the requirement for developing a methodology for estimating emissions by sources and removals by sinks for LULUCF activities under Article 3, paragraph 3, and activities elected under Article 3, paragraph 4, of the Kyoto Protocol.

18. Greece reported in the NIR that no changes had been made in the national system since the previous annual submission.

2. Inventory planning

19. NTUA/SCE is responsible for all inventory-related tasks (data collection, reliability check of input data, selection of appropriate methodology, data processing and archive, assessment of consistency of methodologies applied, performing the recalculations, reliability check of results, key category analysis, uncertainty analysis, etc.), compiles the CRF tables and prepares the NIR, as well as supervising the maintenance of the inventory system. When necessary, the NTUA inventory team is supported by experts from either NTUA or other institutions. The Climate Team within MINENV and the NTUA work with the ministries, government agencies and associations involved to compile the inventory and other reports to the UNFCCC secretariat and the European Commission.

20. The NIR outlines inventory improvements and planned improvements in accordance with the UNFCCC reporting guidelines. The inventory improvement plan establishes a process to address recommendations from previous expert reviews and uses the output from key category analysis, uncertainty analysis and QA/QC procedures to prioritize improvements in the inventory.

21. The ERT concluded that the overall organization of the national system is effective and reliable from the point of view of the institutional, procedural and legal arrangements for the estimation and timely reporting of the GHG emissions and that the Party ensures that capacity is sufficient for the timely performance of the functions.

3. Inventory preparation

Key categories

22. Greece has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat[5] produced slightly different results for 2007 because the Party used a different aggregation of categories. 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 LULUCF. The ERT noted that the key category analysis for 1990 still includes the base year under the Kyoto Protocol (1995) for the fluorinated gases (F-gases) and reiterates the recommendation of the previous review that Greece report the 1990 key category analysis without including F-gases for 1995. The ERT encourages Greece to explore the possibility of reporting CRF table 7 for all years of the time series in its next inventory submission. The ERT acknowledges also that Greece uses key category analysis as a tool to support and guide improvements in its inventory.

Uncertainties

23. Greece has provided a tier 1 uncertainty analysis for 48 categories and for the inventory in total; however, a certain number of categories (mainly from the industrial processes sector and representing around 1 per cent of total emissions in 2007, without LULUCF) were excluded from the analysis. The ERT reiterates the recommendation of the previous review that the Party extend the uncertainty analysis to cover all source and sink categories in line with the requirements of the UNFCCC reporting guidelines. It also reiterates the recommendation of the previous ERT that Greece report an uncertainty analysis for 1990 without including the base year under the Kyoto Protocol (1995) for the F-gases.

24. The uncertainty analysis is based to a great extent on the default uncertainties included in the IPCC good practice guidance and the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, information obtained from NSSG (e.g. for the energy and agriculture sectors), other country-specific information obtained directly from plants and associations, and expert judgement. The ERT encourages Greece to use more country-specific information and to request the institutions providing activity data (AD), or those in charge of estimating emissions, to estimate the relevant uncertainty data. Greece used the results of the uncertainty analysis to prioritize further improvements in the inventory.

25. The results of the uncertainty analysis are presented at both summary level and individual category level. The ERT noted that the estimated quantitative uncertainty in total GHG emissions (without LULUCF) was 7.37 per cent for 2007, while the estimated uncertainty introduced by the trend was 8.96 per cent. The estimated quantitative uncertainty for total GHG emissions (with LULUCF) in the same year was 18.52 per cent, while the estimated uncertainty introduced by the trend was 13.19 per cent.

Recalculations and time-series consistency

26. The recalculations reported by Greece for 1990 through 2006 take into account: (1) changes or refinements in methods and in EFs based on plant-specific data and the European Union emissions trading scheme (EU ETS) reports (e.g. in energy sector: public electricity and heat production; petroleum

[5] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year. 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.

refining; iron and steel; non-ferrous metals; chemicals; pulp, paper and print; food processing, beverages and tobacco); (2) availability of new or updated AD (e.g. in road transportation, railways, navigation, ammonia production, nitric acid production, aluminium production, production of halocarbons and SF_6, and manure management); (3) reallocation of emissions to different sectors or categories (e.g. natural gas used for ammonia production was reallocated from the energy sector to the industrial processes sector); and (4) correction of errors, including correction of AD and/or EFs used (e.g. in iron and steel, chemicals, fugitive emissions from fuels).

27. The recalculations reported in CRF table 8(a) of the 2009 submission show an increase in estimated emissions in 1990 of 0.85 per cent without LULUCF and 0.89 per cent with LULUCF, and a decrease in estimated emissions in 2006 of 3.78 per cent without LULUCF and 3.83 per cent with LULUCF. The recalculations caused significant changes at the category level (e.g. in the energy sector CH_4 emission from energy industries increased by 76.3 per cent for 1990, and N_2O emissions from other sectors decreased by 33.7 for 1990 and increased by 76.6 per cent in 2006; in the industrial processes sector N_2O emissions increased by 55.6 per cent in the base year and decreased by 30.1 per cent in 2006, and HFC emissions decreased by 87.2 per cent and SF_6 emissions increased by 87.2 per cent in 2006). The ERT welcomes the efforts of Greece to document the rationale and impact of the recalculations in the NIR, both in the "Recalculations and improvements" chapter and in the sectoral chapters of the NIR.

28. Greece has recalculated emission estimates in certain sectors using figures from facilities that participated in the EU ETS during the period 2005–2007 (e.g. in the energy and industrial processes sectors). In some cases, country-specific EFs that were calculated based on the average emissions in 2005–2007 have been applied for the 1990–2004 period (e.g. in iron and steel production) or the overlap method has been applied (e.g. in cement production, lime production and glass production), while in others (e.g. in public electricity and heat production, and petroleum refining) the EU ETS EFs have been applied for the 2005–2007 period, while IPCC default EFs were used for the period 1990–2004.

29. Noting the efforts made by Greece to ensure time series consistency in some of the above mentioned cases, the ERT recommends that Greece provide information on whether EU ETS data have been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance and provide further information on the QA/QC procedures applied to these data and how they relate to the corresponding methodology selection and QA/QC and/or verification procedures set out in the IPCC good practice guidance. The ERT recommends that Greece provide information on how the Party has ensured time series consistency when using these data and the impact of using EU ETS data on the emission trends.

Verification and quality assurance/quality control approaches

30. The QA/QC system of Greece was established in April 2004. It is based on the ISO 9001:2000 standard, and has been developed in line with the IPCC good practice guidance. The QA/QC plan was reviewed internally in June 2004 and in May 2008. Greece has developed a quality management handbook that covers processes and procedures embedded in the QA/QC plan. The ERT was also informed that the QA/QC plan and the quality management system (QMS) are being developed further. The ERT acknowledged the progress Greece has made in developing its QA/QC system and reiterates the recommendation of the previous review encouraging Greece to establish more specific procedures to underpin the periodic review of the QA/QC plan and the QMS, using information obtained from the implementation of its QA/QC programme, including from an independent audit.

31. Greece informed the ERT that MINENV underwent an internal audit between September and November 2008. NTUA contracted an independent audit of the inventory in July 2009, the main findings of which were provided to the ERT during the review. Greece informed the ERT in response to a question raised during the review, that the comments received from the independent audit, as well as the

actions taken to address them, will be documented in the next annual submission. The ERT reiterates the recommendation of the previous review encouraging Greece to consider including, in an annex to the NIR, elements of the QA/QC plan and the QMS, any planned improvements, additional information on QA/QC procedures for the data supplied by external sources and explanations of the role of external experts who are not directly involved in the inventory compilation or development process.

32. It also reiterates the recommendation of the previous ERT that Greece improve QC procedures by exploring the development of category-specific QC procedures (tier 2) for all key categories and for those categories in which significant methodological and/or data changes have occurred (e.g. in the industrial processes and waste sectors) and to integrate these procedures into the QA/QC plan and the quality management handbook. The ERT encourages Greece to include details of all improvements in the NIR and its annexes.

Transparency

33. Greece's inventory is generally transparent. The NIR included information on key categories, methods, data sources, uncertainty estimates, recalculations, QA/QC procedures, and verification activities, all of which provide a good basis for the review of the inventory. However, the ERT recommends that Greece provide additional information on the tier used for each category (e.g. in the industrial processes sector), include in the sectoral chapters a description of the development of country-specific EFs and parameters (e.g. in the agriculture sector), more underlying AD and more category-specific information on uncertainty and the QA/QC procedures implemented during preparation of inventory (at least for key categories and for those categories in which significant methodological and/or data changes have occurred), and ensure better use of CRF tables 8(b) (recalculation explanations) and 9(a) (completeness).

4. Inventory management

34. Greece has a centralized archiving system that archives disaggregated EFs and AD, documentation on how these factors and data have been generated and aggregated for the preparation of the inventory, and all underlying calculation sheets, as well as all cited literature. 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.

35. The centralized archive system resides at MINENV. At the start of each inventory compilation cycle MINENV provides a copy of the archived "Centralized Inventory File" to NTUA in accordance with the procedure defined in chapter B of the ministerial circular referred to in paragraph 17 above. Upon completion of the inventory NTUA submits the Centralized Inventory File to MINENV, updated with all the information, data, documentation, etc., used in the compilation of the national inventory. The ERT commends Greece for establishing an archiving process that will help to ensure continuity of inventory compilation.

F. Follow-up to previous reviews

36. Greece has systematically addressed the issues raised in the previous reviews and followed the recommendations where appropriate or possible. Thus, in response to the recommendations from the previous review, the Party has:

(a) Included in an annex to its NIR a list of key categories in the format of tables 5.4.2 and 5.4.3 in chapter 5 of the IPCC good practice guidance for LULUCF, and reported on the analysis for the latest inventory year;

(b) Improved the completeness and transparency of the inventory by including an annex to the NIR on completeness in accordance with the UNFCCC reporting guidelines;

(c) Developed an inventory improvement plan that establishes a process to manage the improvement of the national inventory by addressing recommendations from previous expert reviews and using the output of the key category analysis, uncertainty analysis and QA/QC procedures as a basis to prioritize improvements;

(d) Improved the transparency of the inventory by providing in the NIR more detailed information on methodologies, references to these methodologies, information on the assumptions used in compiling emission estimates, data sources, general background information, rationales for recalculations and assumptions underpinning quantitative estimates of uncertainty, and by including more information in the CRF documentation boxes and table 9(a) (completeness);

(e) Improved the time-series consistency by performing recalculations according to the IPCC good practice guidance and documenting the changes made;

(f) Extended its QA/QC procedures to identify and correct some inconsistencies between the CRF tables and the NIR, and to develop procedures that link with the CRF Reporter software to identify time-series inconsistencies in AD, EFs and estimated emissions;

(g) Reduced the uncertainty of emission estimates from solid waste disposal sites by obtaining better data on the municipal solid waste disposed and its composition, and the amount of biogas emitted;

(h) Established a team of experts to address the issue of inconsistent land representation and to develop a methodology to allow annual updating of the LULUCF part of the inventory;

(i) Reported its commitment period reserve in the NIR.

37. The ERT concluded, however, that Greece has not implemented all the recommendations from the previous review, for example:

(a) Category-specific information on uncertainty and QA/QC procedures, at least for all key categories and other categories in which significant methodological and/or data changes have occurred, has not been provided in the sectoral chapters, as required by the UNFCCC reporting guidelines (although during the review the ERT was provided with examples of such procedures that have already been applied for the 2009 inventory submission);

(b) Explanations for recalculations performed by the Party are provided in CRF table 8(b); however, the list is still not complete and the NIR does not provide detailed information on the rationale for recalculations, such as detailed information on data sources, or justification of the new EFs or methodology underpinning a recalculation (e.g. in the energy sector);

(c) The uncertainty analysis still does not cover all source and sink categories (emissions from categories that have not been included in the uncertainty analysis represent around 1 per cent of total emissions in 2007, without LULUCF);

(d) Elements of the QA/QC plan and the QMS and its records are still not included in an annex to the NIR;

(e) The preparation and reporting of estimates under the LULUCF sector under the Convention and under the Kyoto Protocol has not yet been streamlined within a single institution to minimize duplication of effort and ensure consistency and accuracy of reported data and information;

(f) The key category analysis and uncertainty analysis for the base year 1990 include the base year under the Kyoto Protocol (1995) for the F-gases.

38. The category-specific recommendations still not implemented by Greece are reiterated within the relevant sections of this report.

G. Areas for further improvement

1. Identified by the Party

39. The 2009 NIR identifies several areas for improvement:

(a) Investigating the possibility of implementing methodologies that are consistent with the IPCC good practice guidance for some key categories (e.g. using a higher tier method for CH_4 and N_2O emissions from aviation and navigation and CH_4 emissions from enteric fermentation from cattle);

(b) Integrating results of the inventory review into the plan for improving the inventory;

(c) Addressing the reporting requirements for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;[6]

(d) Investigating the carbon content of fuels in navigation;

(e) Reallocating certain emissions to the correct sector, consistent with UNFCCC guidelines (e.g. emissions from limestone use for desulphurization of flue gases (non-energy fuels used as feedstocks) will be reallocated from the energy sector to the industrial processes sector in the 2010 submission);

(f) Improving the completeness of the inventory (e.g. by including potential emissions of F-gases, actual emissions of F-gases from foam blowing, fire extinguishers, aerosols);

(g) Enhancing collaboration with other research institutions to characterize the country's animal waste management systems.

2. Identified by the expert review team

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

(a) To address the recommendations outstanding from previous reviews;

(b) To ensure, to the extent possible, the inclusion in its next annual submission, emissions for categories currently reported as "NE" and for which methods exist for these categories in the Revised 1996 IPCC guidelines and/or the IPCC good practice guidance,

[6] The Ministry of Rural Development and Food (MRDF) has launched a project to develop a methodology for estimating emissions by sources and removals by sinks for activities under Article 3, paragraph 3, and activity elected under Article 3, paragraph 4, of the Kyoto Protocol.

and if emissions for a given category cannot be estimated then the Party is to provide sufficient explanation in the NIR as to why it cannot be estimated;

(c) To improve the transparency of the inventory by including, in the NIR, additional information on the identification of country-specific EFs and parameters (e.g. for enteric fermentation), an explanation of methodological choices and information on the sources of AD (e.g. for HFCs emissions from ODS substitutes) and more background AD (e.g. for road transportation, civil aviation, enteric fermentation, and solid waste disposal on land);

(d) To reallocate emissions to the correct sectors and categories consistent with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF where necessary (e.g. non-energy use of fuels, net carbon stock change in soil);

(e) To move to higher tier methodologies in line with the IPCC good practice guidance where necessary (e.g. for estimating CH_4 and N_2O emissions from aviation and navigation, and CH_4 emissions from enteric fermentation from cattle, wastewater handling, cropland remaining cropland);

(f) To explore the possibility of making greater use of country-specific EFs (e.g. agricultural soils, manure management);

(g) To provide a justification and documentation supporting the use EU ETS data in line with the IPCC good practice guidance and to ensure the time-series consistency where such data have been used, using the recalculation approaches suggested in the IPCC good practice guidance;

(h) To develop category-specific QC procedures (tier 2) for all key categories and any other categories in which significant methodological and/or data changes have occurred, integrate these procedures into the QA/QC plan and the quality management handbook, and document these improvements in the NIR and its annexes;

(i) To remove inconsistencies between the CRF tables and the NIR by improving QC during the last stages of preparation of the inventory submission;

(j) To enhance the user interface of the national registry by providing the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1, and report on these changes in the next annual submission.

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

II. Energy

A. Sector overview

42. The energy sector is the main sector in the GHG inventory of Greece. In 2007, emissions from the energy sector amounted to 108,108.83 Gg CO_2 eq, or 82.0 per cent of total GHG emissions. Since 1990, emissions have increased by 37.9 per cent. This is mainly due to a 36.3 per cent (15,735.87 Gg CO_2 eq) increase in emissions from the energy industries, and a 60.6 per cent (8,957.35 Gg CO_2 eq) increase in emissions from transport. Within the sector, 54.6 per cent of the emissions were from energy industries, followed by 22.0 per cent from transport, 12.1 per cent from other sectors and 9.8 per cent from manufacturing industries and construction. The remaining 1.5 per cent were fugitive emissions

from fuels. Emissions of CO_2 accounted for 97.6 per cent of sectoral emissions, CH_4 accounted for 1.6 per cent, and N_2O for 0.8 per cent.

43. The estimates for the sector are complete except for some subcategories that are reported as "NE", such as CH_4 and N_2O emissions from lubricants under road transportation, navigation and marine bunkers, and CO_2, CH_4 and N_2O emissions from geothermal energy production. Greece documented those non-estimated categories both in the CRF table 9 and in the NIR, except for lubricants under road transportation. In response to a question from the ERT during the review, Greece stated that it will provide clarification in the next inventory submission.

44. The energy sector is generally transparent and the ERT commends Greece's efforts to provide more detailed information on its choice of methodologies, descriptions of the methodologies and assumptions used, rationales for recalculations, and information on ongoing projects and planned improvements in the sector. However, the ERT recommends that Greece provide more detailed information on AD and parameters used in the NIR and add summary tables of AD and parameters used for the subcategories in the energy sector (e.g. vehicle population by class, fuel consumption rate, distance travelled and other relevant information) to further improve the transparency of reporting. The ERT also recommends that Greece explain the reconciliation between the EU ETS data and the energy balance, include further information on the assumptions made in the calculations (e.g. technology assumptions), and provide tables with the non-CO_2 EFs used for each category.

45. The ERT found that Greece used EU ETS data to estimate emissions from some categories. However, the ERT concluded that the Party has not provided sufficient information in its NIR to confirm if the data have been prepared and incorporated in the inventory submission in line with the IPCC good practice guidance and recommends Greece to provide such information in its next annual submission. The ERT recommends that Greece include information in its next inventory submission on what QA and/or verification procedures were applied to the EU ETS data and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance. The ERT recommends that Greece include a more thorough explanation of how the Party ensured time-series consistency when using EU ETS data in the energy sector.

46. A number of recalculations have been carried out, some in response to the recommendations from the previous expert review (e.g. removal of a conservativeness factor for the base year, reallocation of some emissions to the industrial processes sector, ensuring time-series consistency) and some due to the use of better AD (e.g. revised data for landfill gas used for power production in 2005). The recalculations affected all the categories in the energy sector (leading to a change in estimates of up to ±70 per cent). Overall, the energy sector estimates decreased in 2006 by 650.39 Gg CO_2 eq (or –0.6 per cent) as a result. The ERT commends Greece's efforts to document and justify its recalculations in the NIR.

B. Reference and sectoral approaches

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

47. The estimates derived from the reference approach were 1.96 per cent lower than the estimates from the sectoral approach in 2007 in terms of apparent consumption and 1.33 per cent lower in terms of CO_2 emissions. Greece attributes this to considerable statistical differences in the data on consumption of liquid fuels to losses from transformation, transport and distribution, and to different EFs used for the two approaches. The ERT noticed that the figures reported in CRF table 1.A(c) were different from those reported in the NIR. The ERT recommends that Greece improve QC procedures before the official submission of the inventory in order to eliminate such differences.

48. The figures reported for total apparent consumption corresponds closely to those reported by Greece to the International Energy Agency (IEA), with a difference of about 2 per cent for all the years except 2006 (–4 per cent). The 1990–2007 growth rates for the total apparent consumption are 48 per cent and 44 per cent for the CRF and IEA data, respectively.

2. International bunker fuels

49. Greece has used a tier 2a method to estimate CO_2, CH_4, and N_2O emissions from aviation bunkers, applying default EFs for CO_2 and tier 2a EFs for CH_4 and N_2O. A CORe INventory of AIR emissions (CORINAIR) method and EFs have been used to estimate emissions from marine bunkers.

50. During the review, the ERT noticed that the fuel consumption for international aviation is systematically higher than the IEA data (within 4 per cent for most years). In particular, figures for jet kerosene used in international aviation are about 20 per cent higher than the IEA data for 2003 and 2004. The ERT also noted that jet kerosene for international aviation has not been reported in CRF table 1.A(b) for the years 2006 and 2007 and that domestic air transport figures reported to IEA are much higher than the equivalent CRF data from 1990 to 1997. The ERT also identified discrepancies between table 1.C and table 1.A(b) for jet kerosene (international aviation) for 1990, 2003, 2004, 2006 and 2007. In response to a question raised by the ERT on this matter during the review, Greece stated that it will verify CRF table 1.A(b) and cross-check the 2006 and 2007 jet kerosene data with data from NSSG (energy balance) as well as check working files and corresponding data in the NIR. The ERT recommends that Greece report on the results in the next NIR, along with recalculations of the time series, where appropriate.

3. Feedstocks and non-energy use of fuels

51. The ERT noticed that the implied emission factors (IEFs) for CO_2 from liquid fuels in both the chemicals and other (manufacturing industries and construction) were lower than those of other Parties. In response to a question during the review, Greece explained that this is due to non-energy use of fuels being included as fuel combustion in order to balance the sectoral approach with the reference approach. The ERT noted that this is not in accordance with the Revised 1996 IPCC Guidelines and recommends that Greece remove the non-energy use of fuels from fuel combustion and subtract this amount from the apparent energy consumption in the reference approach. The ERT further reiterates the recommendation of the previous review for any relevant process emissions reported in the energy sector to be reallocated to the industrial processes sector.

C. Key categories

1. Stationary combustion: liquid, gaseous fuel – CO_2

52. There is a marked difference between the CO_2 IEFs for stationary combustion for the years up to 2004 and for the years from 2005 on. For example, the CO_2 IEF for liquid fuels for iron and steel increased by 11.4 per cent (from 68.49 t/TJ in 2004 to 76.32 t/TJ in 2005), the CO_2 IEF for gaseous fuels in the public electricity and heat production sector drops from a constant value of 55.82 t/TJ for the period 1990–2004 to 55.01 t/TJ in 2005, and the CO_2 IEF for liquid fuels in petroleum refining decreases by 5.7 per cent (from 72.92 t/TJ in 2004 to 68.78 t/TJ in 2005). Greece explained that these changes result from using IPCC default EFs for the 1990–2004 period and EFs from verified EU ETS reports for the years 2005–2007. The ERT recommends that Greece justify that the EU ETS data have been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance and ensure time-series consistency in next annual submission.

2. Stationary combustion: solid fuel – CO_2

53. The ERT noticed that the IEF values of CO_2 for chemicals for 1990 (114.3 t/TJ) and 1991 (146.7 t/TJ) are some of the highest of all reporting Parties (48.98–397.82 t/TJ for 1990) for these years and higher than the IPCC default range (94.6–106.7 t/TJ), and higher than the subsequent years' values reported by Greece. In response to a question raised by the ERT during the review, Greece explained that the high 1991 value is due to an incorrect value for fuel consumption in CRF Reporter and will be corrected in the next annual submission. Another reason for the high IEF is the large amount of lignite that is used in the category. The ERT recommends that Greece include some information in the next annual submission on the changes in composition of the fuels mixes by year to explain the variations in the IEF over time.

3. Civil aviation: liquid fuel – CO_2

54. The ERT noted the efforts that Greece has made towards meeting the recommendation from the previous review that it apply a higher tier method for civil aviation. Greece states that approaches for allocating fuels between internal and external transportation were investigated in collaboration with the Civil Aviation Organisation (GCAO) and the Ministry for Development. After a survey by GCAO it was found that the only possible way to collect detailed data was through fuel companies. These data are subject to confidentiality issues; however, Greece believe that they will become available through the inclusion of the aviation sector in the EU ETS. The ERT commends Greece for this effort to resolve the discrepancy in the national energy balance in relation to aviation data. It also reiterates the recommendation of the previous reviews that any new developments or resolution of this matter are to be reported in the next annual submission, which should include the recalculation of the inventory time series and supporting documentation on the methodology and assumptions used.

4. Road transportation – CO_2

55. The ERT noted the recalculations made in the road transportation category to address the recommendations from the previous ERT. The present ERT reiterates the recommendation for Greece to verify the data on lubricants used in road transportation. In addition, the ERT encourages Greece to document the reasons for the recalculations in CRF table 8(b), consistently with the NIR.

III. Industrial processes and solvent and other product use

A. Sector overview

56. In 2007, emissions from the industrial processes sector amounted to 9,099.71 Gg CO_2 eq, or 6.9 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 160.34 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 18.8 per cent in the industrial processes sector, and by 5.5 per cent in the solvent and other product use sector. Notable developments in the industrial processes sector include a decrease in nitric acid production and a halt to HCFC-22 production. Within the sector, 68.9 per cent of the emissions were from cement production, followed by 7.3 per cent from refrigeration and air conditioning, 5.2 per cent from lime production and 4.8 per cent from nitric acid production. Ammonia and aluminium production accounted for 3.5 per cent each.

57. The reporting of the industrial processes sector is generally complete, except for F-gases. Potential emissions have not been estimated, and HFC, PFC and SF_6 emissions from foam blowing, fire extinguishers and solvents, as well as PFC and SF_6 emissions from aerosols/metered dose inhalers are reported as "NE". According to the NIR and to information provided by Greece during the review, it is working to improve the completeness of the inventory regarding these categories. The ERT encourages this effort.

58. The CO_2 emissions from asphalt roofing and road paving with asphalt, as well as all of the N_2O uses in the solvent and other product use sector, are also reported as "NE". Noting that there is no available IPCC methodology for these categories, the ERT encourages Greece to further explore the possibilities for estimating these emissions in future annual submissions.

59. Greece has reported major recalculations of industrial processes emissions in the 2009 submission, resulting in an overall decrease of 30.0 per cent, or 3,922.02 Gg CO_2 eq, in the 2006 estimates for the sector and a 2.4 per cent increase in 1990. The recalculations were undertaken to reflect the availability of new data (e.g. for ammonia production, nitric acid production, aluminium production, production of HCFC-22 and consumption of halocarbons and SF_6) and to respond to the recommendations of the previous review. Specifically, Greece has recalculated emissions for categories that are part of the EU ETS to ensure consistency of the time series; these are iron and steel production, cement production, lime production and glass production. In the case of iron and steel production, a country-specific EF has been calculated based on the average emissions in 2005–2007 and applied for the years 1990–2004. In the case of cement production, lime production and glass production, the overlap method suggested by the IPCC good practice guidance is used to recalculate emissions for 1990–2004. The ERT concluded the recalculation methodologies used are in line with the IPCC good practice guidance. The recalculated estimates between 1990 and 2004 in mineral products are on average 2.5 per cent lower, those in iron and steel production some 58 per cent lower, whereas the estimates between 2005 and 2006 have not changed. During the review, Greece also informed the ERT about the steps taken to ensure completeness of the reporting of these categories. The ERT recommends that Greece include this information in the next annual submission.

B. Key categories

1. Cement production – CO_2

60. For the years 2005 to 2007 the emissions from cement production are estimated based on data from the EU ETS on the quantities of calcium carbonate and magnesium carbonate used in clinker production. Following the recommendation of the previous review, Greece has recalculated the emissions for 1990 to 2004 by using the overlap method of the IPCC good practice guidance.

61. Greece reports the AD as clinker production, in line with the tier 2 method of the IPCC good practice guidance. The previous expert review recommended that it report the AD as equivalent carbonates. In response to a question from the ERT during the review, Greece explained that the AD are reported as clinker production to maintain time-series consistency. In addition, the calcium oxide and magnesium oxide content of clinker for 2005–2007 is reported in the NIR.

2. Ammonia production – CO_2

62. Following the recommendation of the previous review, emissions from ammonia production have been moved to the industrial processes sector from the energy sector. However, this reallocation is only partial, because it covers only natural gas used as feedstocks, whereas emissions from use of lignite (up to 1991) and liquid fuels (up to 1999) are still included in the energy sector. This causes an inconsistency in the time series and fluctuations in the IEFs as indicated in the previous stage of the review. The inconsistency is due to the fact that until 1997, emissions and AD are reported as included elsewhere ("IE"). For 1998 and 1999, the AD cover ammonia production using both natural gas and liquid fuels, but the estimated emissions include only those resulting from the use of natural gas. Since 2000 the AD and emissions are both for natural gas use only, which correctly reflects the situation in ammonia production in the country since 2000. The ERT recommends Greece to improve the time-series consistency of the category estimates in its next annual submission. The ERT also encourages Greece to

apply QA/QC procedures to the obtained plant-specific data, especially concerning the use of natural gas as feedstocks or for energy.

3. Nitric acid production – N_2O

63. Greece applies the default methodology from the IPCC good practice guidance to estimate N_2O emissions from nitric acid production. However, the IPCC good practice guidance recommends the use of plant-specific measurements if nitric acid production is a key category, which is the case here. Greece informed the ERT that such data are not available. The ERT encourages Greece to explore the possibility of obtaining data for future submissions.

64. Following the recommendation of the previous expert review, Greece contacted the nitric acid production plant in the country and has learned that the plant operates under medium pressure instead of atmospheric pressure. The EF used by Greece in the previous inventory submission was 4.5 kg N_2O/t (the IPCC default EF is 4–5 kg N_2O/t) and in 2009 submission it was changed to 7 kg N_2O/t (the IPCC default EF for units operating under medium pressure is 6–7 kg N_2O/t). As a result, the emission estimates are 55.5 percent higher than in the previous inventory submission for the entire time series except for years 2005 and 2006. The recalculations for the category resulted in 13.9 and 30.1 per cent lower estimates for 2005 and 2006. In response to a question raised by the ERT during the review, Greece explained that in addition to the new EF, the AD have been updated for 2005 and 2006 due to new information obtained from the plant.

4. ODS substitutes – HFCs

65. Emissions from refrigeration and air conditioning have been estimated using the IPCC tier 2a methodology. Following the recommendation of the previous review, data collection has been extended by using market surveys and organizing meetings with experts. Based on the new data, major changes have been made to the underlying calculation parameters. In the previous submission, the charge of large commercial applications was estimated to be 100 kg, while the IPCC best estimate for medium and large applications is 50–2,000 kg. In the recalculated estimate, Greece has changed this factor to 10 kg. The recalculated emissions are on average 88 per cent lower between 1995 and 2006 than the emissions in the previous submission. Noting the large impact of the recalculation on the estimates and the deviation of some of the country-specific factors from the IPCC good practice guidance, the ERT recommends that Greece investigate the parameters used for calculation in this category, compare them with the values in the IPCC good practice guidance and either confirm that their use is justified or recalculate the time series, as appropriate, in the next annual submission.

C. Non-key categories

1. Limestone and dolomite use – CO_2

66. The emissions reported under limestone and dolomite use cover uses in iron and steel, aluminium and ceramics production. Limestone use for sulphur dioxide scrubbing and the related emissions are included in the energy sector. During the review, Greece informed the ERT that the reporting of these emissions in the industrial processes sector has already been scheduled for the next annual submission. The ERT welcomes this planned improvement and recommends that Greece investigate whether the reporting under the EU ETS, which is used as a basis for the estimates, includes all limestone used for scrubbing in Greece.

2. Ferroalloys production – CO_2

67. The estimation of CO_2 emissions from ferroalloys production is based on the laterite consumption. The AD and EF are confidential. The non-energy use of fuels in ferroalloys production is

reported in the energy sector. It is stated in the NIR that the information on the use of fuels as reducing agents has been requested from the plants concerned and the data will be used to allocate relevant emissions to the industrial processes sector. The ERT encourages Greece to implement this improvement in the next annual submission.

3. Aluminium production – PFCs and CO_2

68. PFC emissions from aluminium production are estimated using the tier 3b methodology based on plant-specific measurements. The previous review recommended that Greece endeavour to obtain information on the functioning or otherwise of the anode effect termination system in place for the control of PFCs as a means of verifying the variations in emissions. Greece has provided information on the trend fluctuations in the NIR. The ERT commends Greece for this improvement in transparency. The data on aluminium production are confidential. According to the NIR, CO_2 emissions are estimated based on a reference CO_2 EF and aluminium production. The previous review recommended that Greece obtain plant-specific AD for the net anode carbon consumption as a reducing agent for the CO_2 emissions estimation as opposed to using the tier 1a method based on a default emission factor (tonne carbon per tonne aluminium) and aluminium production data. In response to a question raised during the review, Greece informed the ERT that these data have now been obtained from the plant concerned. The ERT encourages Greece to use the new plant-specific data to recalculate the entire time series accordingly.

69. The CO_2 and PFC emissions have been recalculated for 2005–2006 and 2004–2006, respectively, owing to availability of new data from the plant. The impact of the recalculation on the PFC estimates is less than one per cent in each year. In the case of CO_2, the estimates are 2 per cent lower in 2005 and 0.6 per cent higher in 2006 than in the previous submission.

IV. Agriculture

A. Sector overview

70. In 2007, emissions from the agriculture sector amounted to 11,297.76 Gg CO_2 eq, or 8.6 per cent of total GHG emissions. Since the base year, emissions have decreased by 16.3 per cent. The key driver for the fall in emissions is a reduction of N_2O emissions from agricultural soils, due to the reduced application of synthetic fertilizers. Within the sector, 65.9 per cent of the emissions were from agricultural soils, followed by 25.9 per cent from enteric fermentation, 5.9 per cent from manure management and 0.9 per cent from rice cultivation. The remaining 0.3 per cent were from field burning of agricultural residues.

71. The agriculture part of the inventory is complete and includes estimates of all gases and categories. The ERT recommends that Greece improve the transparency of the agriculture sector by including additional descriptions and justifications for country-specific EF and parameters. In response to the recommendation of the previous review, Greece has improved the uncertainty analysis by including detailed, category-specific information on the rationale for the choice of uncertainty values.

72. Greece reports several recalculations for the agriculture sector in the 2009 submission. The recalculations covered the main three categories – enteric fermentation, manure management and agricultural soils – and resulted in a 0.2 per cent decrease (+0.3 per cent for CH_4 and –0.3 per cent for N_2O) in the estimates for the base year and a 1.4 per cent decrease (+2.5 per cent for CH_4 and –3.1 per cent for N_2O) for 2006. The recalculations were performed to reflect improved AD (e.g. revised data on animal populations (1999–2006), synthetic fertilizer use (1990–2006) and crop production (2006)) and to implement previous review recommendations (namely, a revised EF for dairy cattle based on milk production for enteric fermentation). The recalculations are reflected in the NIR; however, there

is not enough information and justification of the revised AD and expert judgements used. The ERT recommends that Greece address this in the next annual submission.

B. Key categories

1. Enteric fermentation – CH_4

73. Greece applies a tier 1 method and the IPCC default EFs to estimate CH_4 emissions from enteric fermentation for all animal species apart from sheep, for which a tier 2 method is used as they are the dominant species in terms of CH_4 emissions. The NIR provides basic information on equations for estimating gross energy in sheep and the input parameters (such as weight of each subcategory, and rates of milk and wool production). However, there is no information provided in the NIR on EFs or the CH_4 conversion rate (Ym) values for each subcategory of sheep. In response to a question raised by the ERT during the review, Greece provided a table including gross energy, Ym and EFs for some subcategories as well as different activities (such as grazing, lactation and growth) of sheep. The ERT recommends that Greece include the tables in the next annual submission.

74. The average gross energy intake of sheep is reported as 22.36 MJ/day in the NIR but as 23.56 MJ/day in the relevant CRF table. During the review, Greece explained that the accurate value is the one referred to in the final NIR, namely 22.36 MJ/day. It informed the ERT that an incorrect figure had been estimated by improper use of an average function during the 2008 in-country review and that the error was identified by the QC checking procedures and corrected in the NIR but not in the CRF table. ERT recommends Greece to increase efforts in sectoral QA/QC for its future inventory submissions and to remove any inconsistencies between the CRF tables and the NIR.

75. The ERT noted that the average Ym of 4.84 per cent reported for sheep is the lowest of all reporting Parties (4.84–7 per cent). In response to a question from the ERT, Greece provided Ym values used for sheep subcategories (5 per cent for lambs and 7 per cent for mature sheep). The ERT noted that the 4.84 per cent reported by Greece is below the 5 per cent Ym for lambs. The ERT concluded that the resulting value is not plausible and recommends that Greece check the calculation and include information on the calculation of the average Ym and the resulting values in the NIR of its next annual submission.

2. Agricultural soils – N_2O

76. The ERT noted that for the nitrogen excretion (Nex) value for goats, Greece uses the IPCC default of 40 kg N/head/year for other animals in Mediterranean countries. This value for goats appears very high compared with the value of 12 kg N/head/year for the similarly sized sheep and is the highest of all reporting Parties (5.76–40 kg N/head/year), with the exception of Japan. In response to a question from the ERT during the review, Greece stated that it is working on a country-specific Nex value for goats. The ERT encourages this planned improvement.

77. Greece uses a mix of 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) for the allocation of manure to animal waste management systems and to estimate N_2O emissions from agricultural soils and manure management. The ERT noted that there is no description of how country-specific data were developed or chosen. In response to a question of the ERT during the review, Greece explained that the allocation to manure management systems per animal species was estimated based on the judgement of experts from several institutes, including the Agricultural University of Athens, the Ministry of Rural Development and Food, the Department of Animal Production at the School of Agriculture Technology (the Technological Educational Institute of Epirus) and the Office of Rural Development of the Prefecture of Thessaloniki. The ERT recommends that Greece continue efforts to improve the country-specific data and to include the information in its next annual submission. The ERT

further recommends that Greece provide additional information to support the expert opinions used for defining the EF in its next annual submission.

78. The previous ERT noted that Greece uses the Nex default values of cattle for Eastern Europe (70 kg/head/year for dairy, 50 kg/head/year for non-dairy) without justifying this choice. The ERT reiterates the recommendation of the previous review for Greece to justify its use of these values. The ERT also recommends that Greece investigate the possibility of developing country-specific Nex values.

C. Non-key categories

Manure management – CH_4

79. Greece used default EFs for Eastern Europe from the Revised 1996 IPCC Guidelines to estimate the CH_4 emissions from manure management, because there are no IPCC default EFs available for the Mediterranean region. To improve the consistency, the ERT encourages Greece to review the appropriateness of using EFs for Eastern Europe and consider developing country-specific EFs.

V. Land use, land-use change and forestry

A. Sector overview

80. In 2007, net removals from the LULUCF sector amounted to 3,650.78 Gg CO_2 eq. Since the base year, net removals have increased by 14.3 per cent, mainly due to forest land, in which removals increased by 42.1 per cent over the time series. The sector offset 2.8 per cent of the total GHG emissions of Greece in 2007. Removals from cropland dropped by 30.1 per cent, while the emissions from grassland increased, from 1.98 Gg CO_2 eq in 1990 to 8.55 Gg CO_2 eq in 2007.

81. The LULUCF sector covers CO_2, CH_4 and N_2O emissions from forest land and cropland. For grassland, only CH_4 and N_2O emissions from biomass burning are reported. For wetland, settlements, other land and other, the notation keys "NO" and "NE" are reported, although the land areas of those categories are provided. The ERT recommends that Greece improve the completeness of its reporting for the land conversions categories and to report thereon in its next annual submission.

82. The Party is commended for enhancing the transparency of the reporting for the LULUCF sector following the recommendations of the previous ERT (e.g. the construction of a land use matrix), but it could be improved further with an explanation of the use of national definitions of land use, a description of how national land-use categories are mapped to the classification scheme of the IPCC good practice guidance for LULUCF and improved documentation of AD. An uncertainty estimate is not presented in the category chapters of the NIR, although the LULUCF sector was included in the uncertainty analysis undertaken by the Party.

83. In the 2009 submission Greece has provided for the first time an overview of the different land-use categories in the country and a land-use matrix for 2006/2007. Greece used several sources and assumptions, including an assumption that the area of forest land remaining forest land is the same as that estimated by the first national forest inventory (1992), as well as an assumption that only cropland that has been converted to forest land since 1994 and recorded under European Commission regulation 2080/92 and 1257/99 is considered. In response to a question from the ERT during the review, Greece stated that for the most recent estimates of land-use areas it used a country-specific data source from 1995 ("Distribution of the Country's Area by Basic Categories of Land Use", NSSG). A more recent source from NSSG with data for 1999–2000 was not used owing to inconsistency of the area data and because these are pre-census data. The ERT welcomes Greece's efforts to present the patterns of land use in the country in a more transparent manner. However, it recommends that Greece try to use more up-to-date data from NSSG for future submissions.

84. Recalculations made within the sector to reflect new AD (e.g. for wildfires, felling rates and fuelwood) have resulted in a 0.6 per cent and 2.4 per cent decrease in the estimates of the 1990 and 2006 sinks, respectively. However, no methodological changes since the previous submission are reported, and most of the recommendations from the previous review are still relevant (e.g. for consistent reporting of emissions and removals under their actual categories, using tier 2 methods for key categories).

85. Greece does not report all instances of deforestation (e.g. land-use changes to settlements are not estimated) and reports that a system for recording deforestation is under preparation and would be available in 2010. Greece only has one (first national) forest inventory and is not planning to start a second one. Greece does report forest land burnt by wildfires under reforestation and started to research the impact of wildfires on the biomass. While Greece selected forest management as an Article 3, paragraph 4 activity, it now uses several tier 1 methods for estimating emissions and removals in forest land remaining forest land and does not report changes in soil carbon stock for cropland converted to forest land owing to a lack of data.

86. Greece reported in the NIR on a project launched by the Ministry of Rural Development and Food responding to the requirement to develop a methodology for estimating emissions by sources and removals by sinks for activities under Article 3, paragraph 3, and activity elected under Article 3, paragraph 4, of the Kyoto Protocol. This project is being carried out by the National Agricultural Research Foundation under the oversight of MRDF and a progress report has already been submitted. Greece stated that the provision of information on anthropogenic GHG emissions by sources and removals by sinks of the above activities is mandatory from 2010 onwards and that this information will be included in the next annual submission. The ERT strongly recommends that the Party ensure that an annual submission of its LULUCF activities under Article 3, paragraph 3, and its elected activity under Article 3, paragraph 4, of the Kyoto Protocol is prepared and reported in accordance with paragraphs 5–9 of the annex to decision 15/CMP.1.

B. Key categories

1. Forest land remaining forest land – CO_2

87. Forest land remaining forest land makes up almost half of the total land-use area of Greece. Wildfires cause large inter-annual variations in emissions and removals – in 2007, 112,762.92 ha were affected by wildfires, about 10 times more than in 2006. The large area of fires decreased removals in 2007 to 2,451.82 Gg CO_2. Increased removals in forest land remaining forest land in recent years are mainly attributable to a reduction in felling. During the review, Greece explained that this reduction in felling (a 5 per cent decrease since 1990) is related to national felling regulations and to initiatives in conservation and sustainable development of existing forest land; individual trees are now felled, rather than entire sub-areas of forest. The ERT recommends that Greece include this explanation in its next annual submission.

88. Greece uses the assumption of 35 years for regrowth of vegetation after wildfires. About 1.2 Mha of forest land are included in the calculation of carbon stocks attributable to regrowth on areas affected by wildfires. The ERT noted that in Greece, forest land burned by wildfires is claimed to be under reforestation. The ERT advises Greece to improve the documentation on the approach taken for these areas in the inventory and to note that for reporting activities under Article 3, paragraph 3, of the Kyoto Protocol, the definition of reforestation is restricted to areas that did not contain forest on 31 December 1989.

89. Greece applies a tier 2 approach, using both country-specific EFs and IPCC default EFs, for estimating the changes in the carbon stocks in living biomass. The ERT reiterates the recommendations of the previous review for Greece to increase the use of country-specific EFs in its future submissions

and investigate the possibility of national soil maps and soil data for use in the reporting of changes in soil carbon.

2. Land converted to forest land – CO_2

90. Greece uses a mix of tier 1 and tier 2 approaches for estimating the changes in the carbon stocks in living biomass, as for forest land remaining forest land. The ERT reiterates the recommendation of the previous review to apply more country-specific EFs.

91. Changes in soil carbon stocks for land converted to forest land are reported under cropland remaining cropland, as a lack of data makes it impossible to stratify areas by crop type. This reporting is not in line with the IPCC good practice guidance for LULUCF. The ERT recommends that Greece report these changes under land converted to forest land in its next annual submission.

3. Cropland remaining cropland – CO_2

92. The ERT noted that Greece also reports soil carbon stock changes from cropland converted to grassland and to forest land in the cropland remaining cropland category. This is not in line with the IPCC good practice guidance for LULUCF. In the NIR, Greece provided information on the methodology used to estimate these carbon stock changes. The ERT considers that as areas of land-use change are known and tier 1 values are applied, it would be possible to allocate the carbon stock changes to the proper land-use (change) categories, and recommends that Greece do so in its next annual submission. The ERT reiterates the recommendation that Greece do not report carbon stock change in soils from cropland converted to grassland and to forest land under cropland remaining cropland.

93. The ERT noted that the area of cropland reported in CRF table 5.B is larger than the cropland area published by the NSSG. In response to a question raised by the ERT on this point during the review, Greece explained that the figure reported in the CRF table is higher because it includes the set-aside area. The ERT recommends that Greece provide information in the next annual submission on this set-aside area and research both the development of set-aside land over time and whether this has consequences for the calculation of carbon stock changes.

C. Non-key categories

Grassland – CH_4 and N_2O

94. Greece estimates emissions of CH_4 and N_2O from wildfires in grassland based on tier 1 methods. The change in carbon stocks in soil for grassland converted to other land-use categories has been reported under the category cropland remaining cropland. As stated in the cropland remaining cropland section above (para. 92), the ERT recommends that Greece report carbon stock changes in soil from grassland conversion under the appropriate categories.

VI. Waste

A. Sector overview

95. In 2007, emissions from the waste sector amounted to 3,187.19 Gg CO_2 eq, or 2.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 28.4 per cent. The key driver for the fall in emissions is an increase in wastewater being treated under aerobic conditions. Within the sector, 76.9 per cent of the emissions were from solid waste disposal on land, followed by 23.0 per cent from wastewater handling. The remaining 0.1 per cent were from waste incineration. Emissions from solid waste disposal on land show an increasing trend (35.6 per cent), while emissions from wastewater handling are gradually decreasing (–72.2 per cent over the time series). Emissions from waste incineration were constant until 2001 and have increased since 2002.

96. Emissions were determined for all the categories except for CH_4 from industrial sludge (owing to a lack of AD), N_2O from industrial wastewater and sludge (lack of a suitable method), N_2O from domestic and commercial sludge (also owing to the lack of a method), and CH_4 and N_2O from clinical waste incineration (lack of EFs). Greece has reported on its efforts to estimate these emissions and include them in future submissions.

97. The ERT noted the improved AD collected for the sector and the improved documentation of the methodologies and recalculations provided in the NIR. Following the recommendation of the previous review Greece has updated data on municipal solid waste (MSW) generation, disposal and composition, aiming also to reduce the uncertainty of the estimates. However, the ERT noted that the uncertainty values for CH_4 emissions from solid waste disposal sites (SWDS) are unchanged from the 2008 submission (i.e. 41.8 per cent for managed sites and 73.0 per cent for unmanaged). During the review, Greece provided the ERT with information on the tier 2 QA/QC procedures that were applied in the sector. The ERT recommends that the Party include this information in its next annual submission, as well as consider revising the uncertainty levels to reflect the use of better data.

98. Recalculations were carried out for all categories within the sector to reflect the updated AD. Recalculations of CH_4 emissions from solid waste disposal on land and wastewater handling resulted in a decrease of emissions by 6.3 and 23.7 per cent for 2006, respectively. The recalculations have been prepared in accordance with the IPCC good practice guidance and the rationales for them are provided in the NIR.

B. Key categories

1. Solid waste disposal on land – CH_4

99. Greece used the first order decay method (tier 2) provided in the IPCC good practice guidance for this key category, with a mix of country-specific data and IPCC default emission parameters. The application of the method was based on assumptions as well as a combination of official data and estimates. The availability of new AD on generated, disposed solid wastes and their composition, and the reconsideration of the starting day of managed SWDS, have led to major improvements in the reporting. Recalculations to reflect these changes have increased the emission estimate for 1990 by 0.3 per cent and decreased the emission estimate for 2006 by 6.3 per cent. Taking into account the method used to estimate the quantities of municipal solid waste, especially for the period 1960–2000, the ERT noted that from the information provided in the NIR it is not clear if the disposal of industrial solid wastes in SWDS was considered in the estimates. The ERT recommends that Greece improve the information provided on this issue in its next annual submission.

100. The fraction of MSW that is garden (yard) waste and park waste was not defined in the calculation of degradable organic carbon (DOC). In response to a question from the ERT during the review, Greece explained that garden waste, park waste and other non-food organic putrescibles were included in the category of putrescibles. Greece informed that the possibility of a more detailed and accurate breakdown of MSW will be examined, taking into account the results of a project for the determination of MSW composition. The ERT recommends that Greece consider, separately, the fraction of MSW that is garden (yard) waste, park waste for the calculation of DOC and provide better information on this issue in the next annual submission.

101. The first order decay method was applied separately for managed and unmanaged SWDS, but because of the lack of background information, all unmanaged sites were considered uncategorized. In line with this assumption, a methane correction factor (MCF) of 0.6 for unmanaged SWDS was used, which is not in line with the IPCC good practice guidance. In response to a questions raised by the ERT during the review, Greece explained that it is working to improve the data regarding the share of MSW

sent to managed and to unmanaged SWDS. The ERT reiterates the recommendation of the previous review that Greece, in its next annual submission, provide the breakdown of landfill sites between 'managed', 'unmanaged' and 'uncategorized', apply the appropriate parameters as required by the IPCC good practice guidance, and recalculate the corresponding time series.

102. According to the CRF table 6.A (additional information), an oxidation factor of zero was used for SWDS. That value would overestimate the emissions calculated for the managed SWDS. The value recommended for managed SWDS covered with oxidizing material is 0.1. The ERT suggests that Greece reassess the value used for the oxidation factor for managed SWDS and revise it, if necessary.

103. According to the information provided in the NIR, the value 0.77 was used for the fraction of DOC dissimilated (DOC_f). The ERT recommends that Greece justify the use of this value or use the default value of 0.5 from the IPCC good practice guidance and recalculate the entire time series accordingly.

104. The DOC and DOC_f for sludge are both estimated at 40 per cent. Justification is not provided for the value used for DOC_f, which differs from the default. During the review Greece provided additional information on this issue, and the ERT recommends that it include this in the next NIR.

105. Recovery and flaring of biogas take place in the four major managed SWDS of Greece but detailed data are only available for Athens. Methane recovered from landfills is also used to generate energy. From the information provided in the NIR it is not clear if all the emissions from biogas flared with energy use were reported under the energy sector. In response to a question from the ERT, Greece explained that in the 2010 submission, detailed information will be provided on the CH_4 recovery used for energy generation. The ERT reiterates the encouragement of the previous ERT that Greece improve the calculation of CH_4 emissions in this category by collecting data on the amount of CH_4 recovery with and without energy use. Furthermore, the ERT recommends that Greece clearly report the allocation of emissions between the waste and energy sectors.

2. Wastewater handling – CH_4

106. CH_4 emissions from wastewater handling were determined using the IPCC default methodology and parameters and country-specific AD. Recalculations using updated AD (1997–2006) related to emissions from sludge and industrial wastewater production resulted in a 23.7 per cent reduction in the emission estimate for 2006. However, there were no methodological changes and the ERT reiterates the recommendation of the previous review that, given that this category is a key category, Greece move to a tier 2 method.

107. According to the NIR the maximum methane production potential (Bo) factor used for industrial wastewater handling is similar to that used for domestic wastewater handling (0.6 kg CH_4/kg BOD (biochemical oxygen demand)). If no country-specific data are available, it is good practice to use the IPCC chemical oxygen demand (COD) default value for Bo (0.25 kg CH_4/kg COD). In response to a question raised by the ERT during the review, the Party stated that it does in fact use the default values for Bo for both industrial wastewater and domestic wastewater as recommended by the IPCC good practice guidance. The ERT suggests that Greece include clarification on this issue in the next annual submission.

108. The information provided in the NIR on the wastewater treatment systems and discharged pathways used in the country is very limited and simplistic given that this is a key category. The wastewater treatment systems were grouped as having either aerobic or anaerobic conditions, with respective MCF values of 0 and 1, even though some of them are not 100 per cent aerobic or anaerobic. Also, the MCF value used for the anaerobic conditions could skew the time series of the CH_4 IEF for industrial wastewater (0.25), which is one of the highest of all reporting Parties (0.001–0.26).

In response to a question on this matter during the review, Greece informed the ERT that data regarding the treatment systems in the country are scarce and that it is looking for ways to improve them. The ERT encourages this planned improvement. It also recommends that Greece expand on the information in the NIR on the country's wastewater treatment systems and on how wastewater is categorized into collected and uncollected, and treated and untreated.

109. Data related to the annual levels of sludge generated in wastewater treatment facilities in the Attica region and the amounts landfilled in the SWDS of Athens were included in the inventory. Information is not provided for other regions of the country. The ERT recommends that Greece improve the information provided on the generation of sludge and disposal practices used in the country and also encourages the Party to obtain AD and estimate the emissions generated by the sludge component of industrial wastewater.

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

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

110. 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 and recommendations included in the SIAR on the SEF and the SEF comparison report.[7] 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.

111. Information on the accounting of Kyoto units has been prepared and reported in accordance with section I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry, and meets the requirements set out in 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 and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

2. National registry

112. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. However, the SIAR mentions that access to the relevant public information (according to paras. 45, 46 and 48 of the annex to decision 13/CMP.1) through the national registry is still limited. The ERT reiterates the recommendation contained in the SIAR for Greece to enhance the user interface of its registry by providing the public information referred to in paragraphs 45 to 48 of the annex to decision 13/CMP.1. It should be clearly

[7] 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.

stated on the registry web site whether that information is deemed confidential or whether no data to display and query exist. The ERT recommends that Greece report on any changes to the list of information that is publicly accessible by means of its registry user interface in its next annual submission.

3. Calculation of commitment period reserve

113. Greece has reported its commitment period reserve in its 2009 annual submission. The Party reported that the reserve has not changed since the initial report review (601,802,826 t CO_2 eq), as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

B. Changes to the national system

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

C. Changes to the national registry

115. Greece reported no change in its national registry since the previous annual submission, besides upgrading the registry software by Smart Technologies GmbH (version 1.1.11.4). The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

VIII. Conclusions and recommendations

116. Greece made its annual submission on 14 April 2009. The Party indicated that it is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on the accounting of Kyoto Protocol units, information on changes to the national system and the national registry). This is in line with decision 15/CMP.1.

117. 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 largely complete and the Party has submitted a set of CRF tables for the years 1990–2007 (without table 7 for the years 1990–2006) and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories and gases. Some of the categories (e.g. actual emissions of HFCs and PFCs from foam blowing, fire extinguishers and solvents; PFC emissions from aerosols/metered dose inhalers) were reported as not estimated. During the review, Greece provided information on the activities being undertaken to include these emission estimates in a future inventory submission.

118. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Greece did not report on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol and information on minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol.

119. The inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. There are minor deviations in the allocation of emissions between the energy, industrial processes and waste sectors, inconsistent time-

series in the energy (stationary combustions), industrial processes (iron and steel production) and waste (wastewater handling) sectors, and use of methodologies not in line with the IPCC good practice guidance within the waste sector (solid waste disposal on land).

120. The 2009 inventory submission shows significant improvement on the 2008 submission. Greece has demonstrated progress in determining country-specific EFs, moving to higher tier methodologies, improving the transparency of the NIR by providing more thorough descriptions in the NIR of background data and methods used to calculate GHG emissions, and addressing completeness by providing in an annex to the NIR a description of the completeness of the inventory. It has also developed an inventory improvement plan that establishes a process to address recommendations from previous expert reviews and use the output of key category analysis, uncertainty analysis and QA/QC procedures as a basis to prioritize future improvements.

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

122. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

123. In the course of the review, the ERT formulated a number of recommendations[8] relating to the completeness of the inventory, transparency, methods, the key category and uncertainty analysis, recalculations, QA/QC activities and elements of Article 7, paragraph 1, information. The key recommendations are that Greece:

(a) Address the recommendations outstanding from previous reviews;

(b) Improve the completeness of the inventory by including emission estimates, especially for those categories for which methods to estimate emissions are available in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance;

(c) Improve the transparency of the inventory by including, in the NIR, additional information on the identification of country-specific EFs and parameters (e.g. for enteric fermentation), an explanation of methodological choices and information on the sources of AD (e.g. for HFCs emissions from ODS substitutes) and more background AD (e.g. for road transportation, civil aviation, enteric fermentation, and solid waste disposal on land);

(d) Provide justification and documentation that the EU ETS data is used in line with the IPCC good practice guidance methods and QA and/or verification procedures and to ensure the time-series consistency where such data have been used;

(e) Develop category-specific QC procedures (tier 2) for all key categories and for any other categories in which significant methodological and/or data changes have occurred (e.g. in ammonia production, solid waste disposal on land), integrate these procedures into the QA/QC plan and the quality management handbook and document these improvements in the NIR and its annexes;

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

(f) Remove inconsistencies between the CRF tables and the NIR (e.g. for comparison of reference and sectoral approach, enteric fermentation parameters);

(g) Explore the possibility of developing and using more country-specific EFs (e.g. for manure management, agricultural soils, forest land remaining forest land, land converted to forest land);

(h) Move to higher tier methodologies in line with the IPCC good practice guidance (e.g. for estimating CH_4 and N_2O emissions from aviation and navigation and CH_4 emissions from enteric fermentation from cattle, wastewater handling and cropland remaining cropland);

(i) Reallocate emissions to the correct sectors and categories consistent with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF where necessary (e.g. non-energy use of fuels, net carbon stock change in soil);

(j) Enhance the user interface of its national registry by providing the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1, and report on any changes to the list of information publicly accessible by means of the registry user interface in the next annual submission.

(k) Ensure that an annual submission on the LULUCF activities under Article 3, paragraph 3, and elected activity under Article 3, paragraph 4, of the Kyoto Protocol is prepared and reported in accordance with paragraphs 5–9 of the annex to decision 15/CMP.1.

IX. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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

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

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

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

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

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

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

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

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

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

FCCC/ARR/2006/GRC. Report of the individual review of the greenhouse gas inventory of Greece submitted in 2006. Available at <http://unfccc.int/resource/docs/2007/arr/grc.pdf>.

FCCC/IRR/2007/GRC. Report of the review of the initial report of Greece. Available at <http://unfccc.int/resource/docs/2007/irr/grc.pdf>.

FCCC/ARR/2008/GRC. Report of the individual review of the greenhouse gas inventories of Greece submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2008/arr/grc2.pdf>.

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

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Elpida Politi and Ms. Nektaria Efthymiou (MINENV), including additional material on the methodology and assumptions used.

Annex II

Acronyms and abbreviations

AD	activity data
Bo	methane production potential
ha	hectare
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COD	chemical oxygen demand?
CRF	common reporting format
DOC	degradable organic carbon
DOC_f	fraction of DOC dissimilated
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gases
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HCFC-22	hydrochlorofluorocarbon-22
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEFs	implied emission factors
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MINENV	Ministry for the Environment, Physical Planning and Public Works
MSW	municipal solid waste
Mt	million tonnes
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
NO	not occuring
N_2O	nitrous oxide
NIR	national inventory report
NSSG	National Statistical Service of Greece
NTUA	National Technical University of Athens
ODS	ozone depleting substances
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
QMS	quality management system
SCE	School of Chemical Engineering
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

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