COMPLIANCE COMMITTEE

CC/ERT/ARR/2010/26
9 April 2010

Report of the individual review of the annual submission of Portugal submitted in 2009

Note by the secretariat

The report of the individual review of the annual submission of Portugal submitted in 2009 was published on 9 April 2010. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2009/PRT, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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

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

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Portugal, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 31 August to 5 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Anke Herold (European Union) and Mr. Harry Vreuls (Netherlands); energy – Ms. Maria Lidén (Sweden) and Mr. Jongikhaya Witi (South Africa); industrial processes – Mr. Teemu Oinonen (Finland) and Mr. Samir Tantawi (Egypt); agriculture – Mr. Steen Gyldenkærne (Denmark); land use, land-use change and forestry (LULUCF) – Mr. Rizaldi Boer (Indonesia) and Mr. Daniel Martino (Uruguay); and waste – Ms. Tatiana Tugui (Republic of Moldova). Ms. Herold and Mr. Martino were the lead reviewers. The review was coordinated by Mr. Javier Hanna (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 Portugal, 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 Portugal was carbon dioxide (CO_2), accounting for 76.7 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (15.7 per cent) and nitrous oxide (N_2O) (6.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.2 per cent of the overall GHG emissions in the country. The energy sector accounted for 70.4 per cent of the total GHG emissions, followed by industrial processes (10.5 per cent), waste (9.4 per cent), agriculture (9.3 per cent) and solvent and other product use (0.4 per cent). Total GHG emissions amounted to 81,840.92 Gg CO_2 eq and increased by 37.9 per cent between the base year[2] 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 and emissions from deforestation that were included in Portugal's initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount.

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[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

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

Table 1. 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	43 583.44	43 583.44	53 202.45	63 751.26	69 678.37	65 228.26	62 792.63	44.1
CH_4	10 120.35	10 120.35	11 254.37	11 363.92	13 006.94	13 057.25	12 815.41	26.6
N_2O	5 565.19	5 565.19	5 816.11	6 279.23	5 738.91	5 541.21	5 278.00	–5.2
HFCs	55.46	NA, NE, NO	55.46	303.56	786.98	852.49	941.12	1 596.9
PFCs	NA, NO	NA, NE, NO	NA, NO	6.08	9.97	6.55	5.72	NA
SF_6	5.55	NA, NE, NO	5.55	6.09	7.41	8.41	8.04	44.9

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Total greenhouse gas emissions" includes emissions from Annex A sources only and excludes emissions and removals from the land use, land-use change and forestry 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	40 422.12	40 422.12	49 035.23	59 630.31	65 002.24	60 350.46	57 582.46	42.5
Industrial processes	4 672.05	4 611.04	5 811.32	6 190.75	8 097.91	8 246.19	8 589.28	83.8
Solvent and other product use	219.71	219.71	256.27	290.02	332.09	339.18	346.26	57.6
Agriculture	8 088.34	8 088.34	8 173.55	8 796.84	8 063.32	7 924.18	7 638.29	–5.6
LULUCF	NA	1 543.23	–3 830.55	–5 978.60	–279.30	–1 993.55	–2 323.84	NA
Waste	5 927.76	5 927.76	7 057.57	6 802.23	7 733.01	7 834.17	7 684.63	29.6
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	60 812.21	66 503.40	75 731.54	88 949.28	82 700.62	79 517.08	NA
Total (without LULUCF)	59 329.98	59 268.98	70 333.95	81 710.14	88 228.58	84 694.17	81 840.92	37.9

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 was submitted on 15 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). Portugal also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including: information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (submitted on 20 April 2009), accounting of Kyoto Protocol units, and information on changes in the national system and in the national registry. The standard electronic format (SEF) tables were submitted on 15 April 2009. Portugal resubmitted its NIR and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol on 27 May 2009. The annual submission was submitted in accordance with decision 15/CMP.1. Portugal 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 year's submission during the review. In addition, the ERT used the standard independent assessment report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

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

Completeness of inventory

8. The Portuguese inventory is complete in terms of years and geographical coverage and covers most sources and sink categories for the period 1990–2007, except for the following categories: use of N_2O for anaesthesia, N_2O from fire extinguishers, N_2O from aerosol cans and CO_2 emissions from agricultural lime (CaO) application, which are all reported as not estimated ("NE"). Portugal has provided explanations for the categories reported as "NE" in CRF table 9(a), stating in general that no activity data (AD) are available. This information has not, however, been summarized in the NIR. The ERT considers that the NIR should include a section on completeness to report information additional to that included in the CRF tables and containing either information on the Party's plans to collect data for these categories or detailed justification for the categories considered negligible or minor emitters and being reported as "NE". After the centralized review, Portugal informed the ERT that it will include estimates of N_2O emissions from anaesthesia in its 2010 annual inventory submission.

9. Nevertheless, the ERT encourages Portugal to make the necessary efforts for estimating all the missing categories for which the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) provide methodologies for their estimation.

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

10. Portugal reports emissions from other transportation and CO_2 emissions from grassland remaining grassland as not occurring ("NO"), which is probably not the correct notation key to have been used. Under the other transportation category, the ERT considers that, inter alia, combustion emissions from pipeline transportation (compressor stations) and ground activities in airports and harbours should be reported. Both activities occur in Portugal, so the notation key "NO" would not be applicable. The NIR does not provide sufficient information that clearly shows that these activities were estimated and included in other categories. The ERT therefore recommends that Portugal estimate emissions for other transportation or provide sufficient explanation in the NIR of its next annual inventory submission to show that estimation methods for other categories include these emissions and use appropriate notation keys. After the centralized review, Portugal informed the ERT that emissions from pipeline transportation are included in the energy balance and considered in the inventory, and that a clear explanation of this issue will be included in the NIR of its 2010 annual inventory submission. For CO_2 emissions from grassland remaining grassland, Portugal explained during the centralized review that it reported these emissions as "NO" because it assumes that carbon stocks in these lands are under steady-state equilibrium. However, the ERT disagrees with this assumption and considers "NE" would be the appropriate notation key and therefore recommends that Portugal make efforts to estimate these emissions in its next annual inventory submission.

11. Summary table 3 provides neither information on the methods and emission factors (EFs) used nor notation keys for HFC and SF_6 emissions from consumption of halocarbons and SF_6. The ERT recommends that Portugal provide this information in its next annual inventory submission. Portugal reports in the NIR that it is planning to add additional sources of SF_6 alongside electrical equipment; however, in the CRF tables, the Party reports the notation key "NO" for all SF_6 subcategories, including other. The ERT encourages Portugal to use "NE" for categories where it is known that some additional (small) sources of emissions exist which are not yet estimated.

D. Main findings

12. 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. It is generally of a good quality, but the ERT identified a need for further methodological improvements and recommends that Portugal:

(a) Continue with the efforts to use a higher-tier methodology for emissions from oil and natural gas and to update emission estimates accordingly in the next annual inventory submission;

(b) Develop national sources of data necessary for estimating emissions from lime production, limestone and dolomite use, carbonate use, glass production, ammonia ($NH_{3)}$ production, nitric acid production, organic chemical industry, iron and steel production and ferroalloys production, instead of the simple linear forecasting and surrogate methods that are used currently;

(c) Proceed with the implementation of plans to develop country-specific digestibility values reflecting the current feed diets in the country for estimating CH_4 emissions from enteric fermentation;

(d) Adopt an EF for indirect N_2O emissions from manure management which is consistent with the dominant practice in the country, instead of using the IPCC default EF;

(e) Include, for the estimation of carbon stock changes due to land-use change, all areas that underwent land-use changes within the transition period and revise the value for the area of land that is reported in the land-use change categories;

(f) Revise the assumptions and methods used for estimating emissions from biomass burning in forest land, and, where country-specific EFs are not available, make use of those provided by the IPCC good practice guidance for LULUCF;

(g) Make efforts to use country-specific parameters in the first-order decay (FOD) model for estimating CH_4 emissions from solid waste disposal on land.

13. The finding referred to in paragraph 12 (b) above was acknowledged by Portugal at the time of the centralized review, and it informed the ERT that in its 2010 submission it will be possible to use national data sources for its estimates of emissions from CaO production, NH_3 production and nitric acid production. In addition, after the centralized review, Portugal informed the ERT that it intends to completely update its emission estimation methodology for LULUCF (see para. 12 (e) and (f) above).

14. Portugal has submitted, in part, on a voluntary basis, 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. The Party did not submit on a voluntary basis information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

15. Portugal has reported, on voluntary basis, information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in accordance with section I.D of the annex to decision 15/CMP.1.

16. Portugal 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.

17. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. Additional formal agreements on the provision of confidential industrial data from the Statistical Council (Conselho Superior de Estatística (CSE)) have been made through a decision of the Permanent Body of Statistical Secret in accordance with the recommendations of the previous review report.[4] This agreement will start to deliver confidential information from 2010 onwards to the Portuguese inventory agency and will be an important basis for improving a number of emission estimates in the industrial processes sector. The ERT considers that these additional arrangements represent a change in the national system which should be incorporated in the description of national system changes in Portugal's next annual submission. After the centralized review, Portugal informed the ERT that it will include this information in its next annual submission.

18. 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).

19. In the course of the review, the ERT formulated a number of recommendations as follows:

(a) Explore the possibility of structuring its reporting in its next annual submission by following in full the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website;[5]

(b) Increase the transparency and completeness of the description of the national system by including in the NIR of its next annual submission a more complete list of institutions involved in the national system and, in addition, a more detailed descriptions of their

[4] FCCC/ARR/2008/PRT.

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

responsibilities and functions in terms of provision of data and information, calculation of inventory estimates, coordination functions, quality assurance/quality control (QA/QC) functions and approval functions (para. 21 below);

(c) Include in the NIR of its next annual inventory submission a separate section on international bunkers including transparent descriptions of how estimates of emissions from bunker fuels have been obtained, as detailed in paragraph 51 below;

(d) Develop a consistent representation of land use (as indicated in paras. 77 and 78 below), and strive for substantial improvements in the reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, including by: performing a key category analysis of these activities (para. 27); following in full the annotated outline and guidance for the NIR (paras. 35, 36 and 95); providing CRF tables for 1990, which is mandatory for cropland management and grassland management activities under Article 3, paragraph 4, of the Kyoto Protocol (para. 94); and implementing the improvements suggested in paragraph 96 below.

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

1. Overview

20. The ERT noted that the national system has been supplemented by additional formal agreements to allow a more complete performance of its required functions. As the previous review report indicated that in general, existing legal arrangements in Portugal do not include legal agreements between the Portuguese Environment Agency (APA) and the relevant collaborating institutions (e.g. the National Statistics Institute (INE)), the ERT considers that this situation does not affect the functions of the national system as long as the inventory agency regularly receives sufficient information from relevant collaborating institutions in a timely manner. The problems related to access to confidential information for estimating some categories in the industrial processes sector have been resolved by a decision of the Permanent Body of Statistical Secret (see para. 17 above). The ERT recommends that Portugal report this development in the NIR of its next annual inventory submission as an improvement both to the national system and to the industrial processes inventory. After the centralized review, Portugal informed the ERT that it will include this information in its next annual inventory submission.

21. Portugal has described the national system and institutional arrangements for the preparation of the inventory in its NIR. APA has overall responsibility for the national inventory. Other organizations are involved in the preparation of the inventory, and the respective areas of responsibility are listed in the relevant section of the NIR. However, other parts of the NIR mention other institutions being involved in the preparation, planning or management of the inventory; for example, Ecoprogresso performed tier 2 QC checks for all sectors and reported the results in a separate report. Hence, the list of entities involved does not seem to be complete. The ERT recommends that Portugal increase the transparency and completeness of the description of the national system by including in the NIR of its next annual submission a complete list of institutions involved and more detailed descriptions of their responsibilities and functions in terms of provision of data and information, calculation of inventory estimates, coordination functions, QA/QC functions and approval functions. Table 1.4 in the NIR should differentiate more clearly between the institutions providing data and the sources of those data.

22. The NIR does not specify which ministries are responsible for APA, the budget of the inventory preparation, legal agreements, and so forth. The NIR also does not provide information on any changes and the institutional arrangements since the previous annual submission. However, the ERT noted that

changes in the national system were reported under future developments. The description of the national system in the NIR should be updated when, for example, new institutional arrangements are established.

23. Portugal plans to use data and emissions reported by installations to competent authorities under the European Union emissions trading scheme (EU ETS) to a larger extent for QA/QC purposes, and is planning further efforts to ensure data consistency between EU ETS data and the inventory. The ERT recommends that Portugal implement these plans as soon as possible for all inventory categories covered by the EU ETS system, as this exercise will provide reviewers with further information on the approach that Portugal currently uses, for example in the energy sector in combining data from large plant sources with energy balance data.

2. Inventory planning

24. The NIR explains that future improvements to the inventory are set out annually in the Methodological Development Plan (PDM) under the responsibility of APA, and that it reflects, inter alia, issues raised by the UNFCCC review process and the results of QA/QC procedures. Thus, Portugal puts in place specific responsibilities and procedures for the continued improvement of its inventory planning. Nevertheless, there are a number of recommendations of the UNFCCC review process that have been reiterated in several previous review reports and that several NIRs have indicated that these recommendations are planned to be implemented or resolved in the subsequent annual inventory submission, but have not yet been acted on, such as the performance of a tier 2 uncertainty analysis. The ERT recommends that Portugal report and properly explain in the NIR of its future annual submissions any delays or problems in the reported planned improvements, and include dates for when the improvements are expected to be implemented.

3. Inventory preparation

Key categories

25. Portugal has reported a key category tier 2 analysis, both level and trend assessment, as part of its 2009 submission. It also used qualitative criteria for determining key categories. Portugal 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 key category analysis performed by the Party and that performed by the secretariat[6] produced similar results, with differences related to the categories close to the threshold. For example, N_2O from nitric acid production was identified as a key category by the secretariat but not by the Party. The difference from the secretariat's key category assessment may be due to the use of different levels of disaggregation for some categories and different tiers used for these analyses and the fact that Portugal used the country-specific approach indicated in the IPCC good practice guidance for determining the threshold (90 per cent), which would account for 55–85 per cent of the uncertainty in the national inventory. The ERT encourages Portugal to provide information on how this country-specific threshold was determined in the NIR of its next annual inventory submission.

26. In the 2009 submission Portugal identified 51 key categories, compared with 49 key categories in the 2008 submission. The additional categories are N_2O from public electricity and heat production –

[6] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

biomass and HFCs from foam blowing. The identification of N_2O from public electricity and heat production reflects the use of an increased EF for N_2O from biomass.

27. Portugal has not identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT encourages Portugal to include this information in its next annual submission under the Kyoto Protocol, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

Uncertainties

28. Portugal has reported a detailed uncertainty analysis in its 2009 submission. Uncertainties have been estimated for all categories by gas using the IPCC tier 1 methodology, and for the inventory as a whole including the LULUCF sector in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Overall uncertainty declines over the time series, from 12.9 per cent in 1990 to 8.7 per cent in 2007. The uncertainty values, both for AD and for EFs, are discussed in the NIR for each individual sector.

29. Portugal did not perform the tier 2 uncertainty analysis that had been announced for the 2009 submission in the NIR of the previous submission. No explanation of why this planned activity was not implemented was given. The ERT encourages that Portugal implement the tier 2 uncertainty analysis in its next annual inventory submission.

Recalculations and time-series consistency

30. The recalculations undertaken in the 2009 submission resulted in an overall 0.27 per cent increase in estimated total emissions without LULUCF for 1990 and an increase by 5.25 per cent in the emission estimates for 2006. When the LULUCF sector is included, the impact of the recalculations on the estimated emissions is almost the same (+0.26 per cent) for 1990 and less significant for 2006 (+2.37 per cent). The recalculations have also increased the emission trend: in the previous submission the change in emissions from 1990 to 2006 was 40.0 per cent for total GHG emissions without LULUCF, whereas this change is 42.9 per cent in the 2009 submission. The recalculations that made the greatest contribution to this increase are the recalculations of CO_2 emissions from fuel combustion activities (energy industries and manufacturing industries and construction), CO_2 emissions from mineral products and CH_4 emissions from solid waste disposal on land and wastewater handling.

31. The rationale for these recalculations is provided in the NIR (in chapter 10 on recalculations as well as in the sectoral chapters) and in CRF table 8(b). The ERT noted that recalculations of the time series 1990 to 2006 were undertaken to take into account the following changes, which are indicated in the NIR and CRF table 8(b): (1) in the energy sector, use of updated AD and reallocation of emissions from municipal waste incineration with energy recovery from the solid waste disposal on land category to the public electricity and heat production category, and use of an updated lower heating value for coke; (2) in the industrial processes sector, use of updated AD for cement production and road paving with asphalt; and (3) in the waste sector, revisions of the flared quantities of CH_4 in solid waste disposal on land and use of a revised estimate of the share of the population served by wastewater treatment systems. Substantial recalculations in the LULUCF sector reflect revisions of harvest data for the period 2004–2006 for forest land.

Verification and quality assurance/quality control approaches

32. The NIR provides a brief overview of the QA/QC system established as part of the national system which includes the PDM and an integrated management system. The description in the NIR does not explain how the system ensures that all data contributors, including external data providers,

implement QA/QC procedures following the established procedures and manuals. The ERT recommends that Portugal include this information in the section on QA/QC in the NIR of its next annual inventory submission.

33. A new report by Ecoprogresso on tier 2 QC procedures implemented for the 2009 inventory is referenced in the NIR and available at the APA website. The ERT commends Portugal for introducing these additional, comprehensive QC activities across all sectors. It recommends that Portugal integrate the procedures into the regular QA/QC activities for individual sectors and add the described activities and results to the sections on sector-specific QA/QC and verification in the NIR of its next annual inventory submission as recommended in the annotated NIR outline provided by the UNFCCC secretariat.

Transparency

34. In general, Portugal provides a well-structured and detailed description of methodologies and data sources in the NIR. The transparency of the NIR has been improved and a number of recommendations of previous review reports have been addressed in the 2009 submission. Portugal generally follows the annotated outline for NIRs provided by the secretariat for both the inventory information and the supplementary information under Article 7, paragraph 1. Notation keys are extensively used and generally in a correct way.

35. Complementing the CRF tables on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Portugal has provided a supplement to the NIR which provides the information requested under Article 7, paragraph 1, for these activities and which generally follows the structure proposed in the annotated outline for NIRs. However, the ERT encourages Portugal to follow this outline and the guidance contained therein in full in its next annual submission.

36. At a more detailed level there remain a number of areas where transparency should be further improved. The NIR explains how recommendations from previous UNFCCC reviews have been addressed for some categories or areas. However, there is no systematic overview in the NIR of if and how findings of previous review reports have been addressed. As this information can be expected to be included in the PDM updated annually by Portugal, the ERT encourages Portugal to provide such an overview in section 10.4 on recalculations and improvements in the NIR, in accordance with the annotated NIR outline. After the centralized review, Portugal informed the ERT that it will include such information in its next annual inventory submission.

4. Inventory management

37. Portugal has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, calculation spreadsheets and documentation of the data sources. The archived information also includes internal documentation on QA/QC procedures. The current system has limitations in its storage capacities and Portugal is investigating ways to restructure the entire inventory archiving and documentation system, which would qualify as a change in the national system. The ERT encourages Portugal to implement the restructuring of the archiving and documentation system in order to resolve the storage capacity problems and to report on the status of changes in its next annual submission and in future NIRs, as necessary.

F. Follow-up to previous reviews

38. Portugal has made a number of improvements in the 2009 inventory submission which reflect recommendations from previous review reports, such as the process that triggered a decision to improve the inventory agency's access to confidential data for several industrial processes categories and updates in several areas in the NIR following these recommendations.

39. As indicated in paragraphs 24 and 36 above, Portugal does not systematically document the improvements implemented in response to recommendations from previous review reports. As the recommendations have to be checked in detail in order to assess the improvements, the ERT recommends that Portugal document the follow-up activities to previous reviews in a more transparent and systematic way in chapter 10 of the NIR of its next annual inventory submission.

40. There are a number of recommendations that have not yet been addressed and for which no information on whether Portugal plans to address them and by when has been provided, such as the construction of a consistent land-use matrix, improvement of consistency of the land-use information or restructuring the LULUCF chapter of the NIR, in accordance with the UNFCCC reporting guidelines and the IPCC good practice guidance for LULUCF. The ERT also recommends that Portugal include such information as part of more systematic documentation of follow-up activities in the NIR of its next annual inventory submission.

G. Areas for further improvement

1. Identified by the Party

41. The 2009 NIR identifies several areas for improvement. Portugal indicated that it is working to improve its inventory in the following areas:

(a) Update industrial production and external commerce data from INE from 2001 onwards to improve emission estimates in the industrial processes sector, as recommended in previous review reports;

(b) Use more widespread plant-specific EFs and AD (e.g. from the EU ETS) and streamline energy balance data and plant-specific data sets;

(c) Use the COPERT IV model and EFs for the 2010 annual inventory submission;

(d) Achieve more complete coverage of the aircraft movement database;

(e) Estimate emissions from closed coal mines;

(f) Improve estimates of fugitive emissions from storage in tanks, emissions from catalyst regeneration and emissions from sulphur recovery in refineries;

(g) Use a higher-tier method for fugitive emissions from gas distribution and transmission based on data from the country's gas distribution company;

(h) Improve AD in several industrial processes categories such as CaO production, glass production, NH_3 production, and iron and steel production;

(i) Obtain plant-specific EFs for nitric acid production and chemical production;

(j) Incorporate additional sources of fluorinated gases in the inventory;

(k) Improve nitrogen excretion rates (Nex) reflecting changes over time;

(l) Improve AD on nitrogen (N) fertilizers;

(m) Further develop and improve the methodologies used for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

42. After the centralized review, Portugal informed the ERT that issues under paragraph 41 (a) and (h) will be improved in its 2010 annual inventory submission.

2. Identified by the expert review team

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

(a) Increase the completeness of reporting by including estimates for categories reported as "NE" (e.g. CO_2 emissions from agricultural CaO application), estimates for other transportation (reported as "NO") and estimates of actual emissions of PFCs for refrigeration and air conditioning, giving priority to missing categories for which the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF provide estimation methodologies;

(b) Increase the accuracy of estimates by using higher-tier methods for key categories (e.g. by using country-specific data on calcium oxide and magnesium oxide (MgO) content of clinker for the cement production category), by replacing the use of surrogate or forecast data with national data (e.g. for industrial processes categories) and by using appropriate AD (e.g. for feed digestibility in relation to CH_4 emissions from enteric fermentation, for Nex for dairy cows and swine, and for the assumed distribution of animal waste management systems (AWMS));

(c) Enhance the transparency of: the reporting of international bunkers and mobile combustion; the use of expert judgement in estimates for the agriculture sector; and the description of methods used and assumptions made for estimates in the LULUCF sector.

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

II. Energy

A. Sector overview

45. The energy sector is the main sector in the GHG inventory of Portugal. In 2007, emissions from the energy sector amounted to 57,582.46 Gg CO_2 eq, or 70.4 per cent of total GHG emissions. Since 1990, emissions have increased by 42.5 per cent. The key drivers for the rise in emissions are the increases in activity of transport and energy industries, whose emissions increased by 92.1 per cent and 24.4 per cent, respectively. Within the sector, 34.6 per cent of the emissions were from energy industries, followed by 33.9 per cent from transport, 18.9 per cent from manufacturing industries and construction and 9.8 per cent from other sectors. Fugitive emissions from oil and natural gas accounted for 2.8 per cent. The remaining 0.1 per cent was from other.

46. Overall, the inventory for the energy sector is reported in a transparent manner. Emissions have been estimated and reported for practically all categories, except for N_2O from flaring. Descriptions of the methods used, sets of EFs and energy content values have been included in the NIR. The energy balance has also been included, as had been suggested in previous review reports.

47. However, the ERT considers that the transparency of the NIR could be improved, particularly regarding mobile combustion. The ERT noted that recalculations are not reported for civil aviation (despite the fact that a new estimation method is being used for this category) or other transport categories. Also, it is not clear whether the split between domestic aviation and navigation and international bunkers is fully in line with the Revised 1996 IPCC Guidelines. The ERT recommends that Portugal improve the transparency of the NIR of its next annual inventory submission by:

(a) Improving the order and descriptions of the energy sector categories (particularly for transport), following the recommendations of the UNFCCC reporting guidelines in full;

(b) Stating clearly for each category whether recalculations have been performed;

(c) Including a separate section on international bunkers;

(d) Improving the clarity of the division between civil aviation, navigation, military aviation, military navigation, military ground transport, aviation bunkers and marine bunkers.

48. The recalculations reported in the 2009 submission are well explained in the NIR and the CRF tables, except for mobile combustion as mentioned. Recalculations were performed for most categories, mainly to take into account updates to fuel consumption data and data on industrial production for the whole time series. Some sector-specific QA/QC procedures have been reported in the NIR, such as comparisons made between large-point sources data and energy balance data. The ERT recommends that Portugal report such verification in the NIR of its next annual inventory submission under the heading "category-specific QA/QC and verification". Uncertainties have been assessed for all categories in the sector using the tier 1 approach and following the recommendations of the IPCC good practice guidance. The ERT encourages Portugal, when assessing uncertainties in its next annual inventory submission, to take into account the differences between large-point sources data and the energy balance, as well as the years for which these AD are available.

B. Reference and sectoral approaches

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

49. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2007, there is a difference of 3.46 per cent between the two estimates. Explanations are provided in the documentation box of CRF table 1.A(c). In addition, the NIR provides explanations for the fluctuations in the differences between the two approaches over the years. According to the NIR, the main reason for the differences is that the energy balance data used for the reference approach classifies fuel sales to aviation and navigation in domestic and international according to the flag of the aircraft and vessel, whereas data used in the sectoral approach are based on detailed flight and maritime movements and aircraft operation characteristics.

50. Apparent consumption in Portugal's reference approach does not correspond closely to the International Energy Agency (IEA) data. The apparent consumption figures reported to the UNFCCC by Portugal are systematically higher than those reported to the IEA (within 8 per cent); however, data in the latest years tend to be closer. In its responses to previous stages of the review, Portugal indicated that it will work closely with experts from the General Directorate for Energy Geology (DGEG), which is the country's IEA reporting agency, to identify possible reasons for these differences identified in the data (see para. 49 above). The ERT encourages Portugal to do so for its next annual inventory submission.

2. International bunker fuels

51. Portugal reports in the NIR that emissions from aviation international bunkers are estimated using a tier 2a method. The figures for fuel consumption for international aviation and navigation differ from what is reported in the reference approach and to IEA. According to information given by Portugal during the centralized review, the split between domestic and international fuel consumption in fuel sales statistics from DGEG is not in accordance with the IPCC good practice guidance (see para. 49 above). Since DGEG reports to IEA, discrepancies are expected. Portugal also informed the ERT that APA and DGEG are making efforts to bring the split between domestic and international fuel consumption in line with the IPCC good practice guidance. The ERT welcomes this planned improvement and recommends

that Portugal document the results of its efforts to achieve a split between domestic and international fuel consumption in the reference approach fully consistent with the IPCC good practice guidance in the NIR of its next annual inventory submission.

52. The reporting of international bunkers is not transparent, since the NIR does not include a section on international bunkers, but only short notes in the sections covering civil aviation, navigation and fisheries. This is not in line with the UNFCCC reporting guidelines. The ERT recommends that Portugal include a separate section on international bunkers in the NIR of its next annual inventory submission, and provide transparent descriptions in this section of how estimates of emissions from bunker fuels have been obtained.

3. Feedstocks and non-energy use of fuels

53. With regard to feedstocks and non-energy use of fuels, Portugal has reported in its NIR that emissions from mineral oil used as lubricant and from bitumen used in road paving are included in the reference approach but are not part of the sectoral approach. The ERT reiterates the recommendation made in previous review reports that Portugal continue to make efforts to improve its estimates of emissions from the use of feedstocks and include estimates of combustion emissions from feedstock and non-energy use of fuels in the sectoral approach in its next annual inventory submission.

C. Key categories

1. Civil aviation: liquid fuels – CO_2, CH_4 and N_2O[7]

54. For the first time, Portugal has used a tier 2a method for estimating emissions from jet kerosene consumption, which is in line with the recommendations from previous review reports. To implement this method, the best available AD have been used for all years. During the centralized review, Portugal informed the ERT that the AD for the years 1990–1999 are incomplete. For this reason, Portugal tested the possibility of extrapolating 2000–2007 AD for the 1990–1999 period; however, it concluded that extrapolations would not improve the quality of the inventory and the tier 2a method was kept for all years. The ERT commends Portugal for its efforts in developing the most accurate method possible for obtaining data, for the transparent description of this work in the NIR and also for verifying the accuracy of this method by alternative calculations. The ERT encourages Portugal to provide a description of the alternative calculations used for verifying this method in the NIR of its next annual inventory submission, as a sector-specific QA/QC procedure.

2. Road transportation: liquid fuels – N_2O

55. Portugal estimates N_2O emissions from road transportation using a model for emission calculation called BURNN, which is compatible with, and based extensively on, the methodology from the *EMEP/CORINAIR Emission Inventory Guidebook*,[8] together with a module to determine the national vehicle fleet known as KAR. This last module estimates annual fleet from long time series of vehicle sales and abatements. The EFs were determined from the available set of algorithms reported in the EMEP/CORINAIR guidebook. The ERT noted an important increase of 326.7 per cent in N_2O emissions from this category over the period 1990–2007, reflecting the increasing use of vehicles with catalytic converters. As indicated in the NIR, Portugal is planning to use the COPERT IV model for the 2010 submission, which may imply a change in N_2O EFs and resulting emission estimates. The ERT

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[7] Not all emissions related to all gases under this category are key categories, particularly CH_4 and N_2O emissions. However, since the calculation procedures for and issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

[8] European Environment Agency. 2002. *Joint EMEP/CORINAIR Atmospheric Emission Inventory Guidebook , Third Edition*. Available at <http://www.eea.europa.eu/publications/EMEPCORINAIR3>.

recommends that Portugal provide transparent information on the migration to COPERT IV and the resulting changes in its next annual inventory submission.

3. Oil and natural gas – CO_2 and CH_4

56. The ERT identified significant fluctuations in the trends of CO_2 and CH_4 emissions from natural gas (e.g. ranging from –42.2 to +207.6 per cent in the transmission subcategory for 1997–2007). In its response to questions raised during the centralized review on this matter, Portugal informed the ERT that these inter-annual changes result from the transmission and distribution losses reported in the energy balance and that the inventory team will clarify this issue with DGEG. According to the NIR, efforts are already being made by the inventory team together with DGEG and the main company responsible for transportation of natural gas in Portugal to implement a higher-tier methodology for this category. The ERT welcomes this planned improvement and encourages Portugal to continue with its efforts to use a higher-tier methodology and to update emission estimates from this category in its next annual inventory submission.

D. Non-key categories

1. Other transportation: all fuels – CO_2, CH_4 and N_2O

57. Under other transportation, Portugal has reported AD and emissions as "NO". However, since Portugal reports fugitive emissions from transmission of natural gas and distribution of oil products, the ERT considers that emissions should be occurring under this category, including, for example, combustion emissions from compressor stations for natural gas transport. During the 2008 review, Portugal informed the previous ERT that after consultation with DGEG it was concluded that specific data for other transportation could not be obtained separately, as consumption of fuel under this category is accounted for in the energy balance together with other sectors such as services, commercial and institutional, and manufacturing industry (non-cogeneration fuel consumption). The ERT therefore reiterates the recommendation from the previous review report that Portugal use the notation key included elsewhere ("IE") for this category as opposed to "NO", and recommends that it provide information in the NIR to ensure the accounting of these emissions under other categories, as well as continue with its efforts to report estimates for this category in its future annual inventory submissions.

2. Other – mobile: liquid fuels – CO_2, CH_4 and N_2O

58. Emissions from military navigation and military ground transport are not mentioned in the NIR. Portugal informed the ERT during the centralized review that these emissions are included under navigation and road transportation. To increase transparency, the ERT recommends that Portugal either provide information about this in the NIR of its next annual inventory submission or obtain the data necessary to estimate and report emissions from military navigation and military ground transport separately.

III. Industrial processes and solvent and other product use

A. Sector overview

59. In 2007, emissions from the industrial processes sector amounted to 8,589.28 Gg CO_2 eq, or 10.5 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 346.26 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since the base year, emissions have increased by 83.8 per cent in the industrial processes sector, and by 57.6 per cent in the solvent and other product use sector. The key driver for the rise in emissions in the industrial processes sector is the growth of emissions from mineral products, the chemical industry and consumption of halocarbons and SF_6 owing to the considerable increase in these industrial activities. Within the industrial processes

sector, 56.4 per cent of the emissions were from mineral products, followed by 32.3 per cent from the chemical industry, 11.1 per cent from consumption of halocarbons and SF_6, 0.2 per cent from metal production and 0.01 per cent from other production.

60. The inventory of the industrial processes and solvent and other produce use sectors is generally complete. The following categories are reported as "NE": use of N_2O for anaesthesia, N_2O from fire extinguishers, N_2O from aerosol cans, other use of N_2O and N_2O from other (solvent and other product use (3.D.5)). For these categories there are no methodologies available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Also, actual emissions of PFCs for refrigeration and air conditioning are reported as "NO". However, potential emissions for this category are reported in the CRF tables. The ERT encourages Portugal to provide estimates for these categories in its next annual inventory submission.

61. Portugal reports actual emissions of HFCs from foam blowing, fire extinguishers and metered dose inhalers. No potential emissions, however, are reported for these subcategories. Instead, the notation key "NO" is used. The ERT believes that the correct notation key to be used is "NE". After the centralized review, Portugal informed the ERT that these potential emissions have been estimated but due to a compilation error they were not reported; however, the Party indicated that they will be included in future submissions. The ERT acknowledges this information and recommends that Portugal report these estimates in its next annual inventory submission.

62. Portugal has used simple linear forecasts and surrogate methods to calculate AD used for emission estimates for CaO production, limestone and dolomite use, carbonate use, glass production, NH_3 production, nitric acid production, organic chemical industry, iron and steel production, and ferroalloys production. In many cases, the AD for the years 2001–2007 are based on forecasts. The ERT recommends that Portugal develop national sources of AD necessary for estimating emissions from these categories. Portugal informed the ERT during the centralized review that in its 2010 submission, this will be possible for the following categories: CaO production, NH_3 production and nitric acid production. In fact, the ERT believes that for most of the categories mentioned, more recent plant-specific data are reported under the EU ETS or are currently collected for the allocation under the EU ETS, and it therefore strongly recommends that Portugal use plant-specific data for the reporting of these categories instead of forecast and surrogate methods and that it ensure consistency of the time series in its next annual inventory submission.

B. Key categories

1. Cement production – CO_2

63. Portugal uses a tier 2 method and an EF (0.507 t CO_2/t clinker) based on the default CaO fraction in clinker (64.6 per cent) for estimating CO_2 emissions from cement production. In the NIR, it is stated that the use of this EF is due to a lack of country-specific data on CaO and MgO content in clinker. Since this is a key category, the ERT recommends that Portugal develop an EF based on national data through establishing direct contacts with cement producers or checking the detailed reporting to competent authorities under the EU ETS for its next annual inventory submission.

2. Consumption of halocarbons and SF_6 – HFCs

64. The time series of HFC emissions for the foam blowing subcategory reported in the CRF tables displays high inter-annual variation. For instance, emissions increased by 182.7 per cent between 2002 and 2003, and decreased by 34.7 per cent between 2005 and 2006. These unusual year-to-year fluctuations were not explained in the NIR. During the centralized review, Portugal informed the ERT that these fluctuations are due to the incorporation of a new plant in 2003 and a calculation error in the 2006 estimates. The ERT recommends that Portugal revise its emission estimates where necessary for its

next annual inventory submission and provide justification in the NIR of any change in trends for the whole time series.

C. Non-key categories

1. Nitric acid production – N_2O

65. Portugal bases the N_2O EF (7.52 kg/t HNO_3) used in its estimates of nitric acid production emissions on monitoring data from one of the three existing production units in Portugal. During the centralized review, Portugal explained to the ERT that no assessment has been made of whether the selected EF is representative of the other two units. The ERT encourages Portugal to collect data from these two units, verify if the EF used is indeed representative for all production units, and report on the results in the next annual inventory submission. The AD are confidential for this category. For the years after 2001, AD were estimated using simple linear interpolation based on data for the total production of nitric acid in Portugal available for the period 1990–2000 from different sources. Portugal informed the ERT during the centralized review that in its 2010 submission, national AD will be used for the estimates in this category. The ERT welcomes this effort and recommends that Portugal implement this plan.

2. Consumption of halocarbons and SF_6 – SF_6

66. The potential SF_6 emissions from the consumption of halocarbons and SF_6 as reported in CRF table 2(II) are significantly larger than actual SF_6 emissions. During the centralized review, Portugal informed the ERT that this reported value is not correct. The ERT recommends that Portugal revise the reported potential emissions of SF_6, report the new estimates in its next annual inventory submission and improve its QC procedures.

IV. Agriculture

A. Sector overview

67. In 2009, emissions from the agriculture sector amounted to 7,638.29 Gg CO_2 eq, or 9.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 5.6 per cent. The key driver for the fall in emissions is a decrease in N_2O emissions due to a decline in the consumption of mineral nitrogen fertilizers; at the same time, the ERT noted an increase in CH_4 from enteric fermentation (13.6 per cent). Within the sector, 39.0 per cent of the emissions were from enteric fermentation, followed by 32.6 per cent from agricultural soils, 22.8 per cent from manure management and 5.1 per cent from rice cultivation.

68. The NIR is well structured and gives a detailed description of the methodologies used. Many recommendations from the previous review reports have been implemented and reported in the NIR. The ERT welcomes this, but recommends that Portugal improve the transparency of its NIR further by providing more supporting information in its next annual inventory submission on how inputs based on expert judgment and other basic input parameters are derived. All relevant categories and GHGs have been reported, except for prescribed burning of savannas, which has been reported as "NO".

69. Portugal has recalculated N_2O emissions from agriculture, and this resulted in a reduction of the emission estimate for 2006 by 13.1 per cent, primarily due to lower estimates of emissions from agricultural soils and, to a lesser extent, from enteric fermentation.

B. Key categories

1. Enteric fermentation – CH_4

70. Portugal uses an IPCC tier 2 method and a regression model based on default IPCC EFs to estimate emissions from enteric fermentation. The same value (60 per cent) for digestibility (DE) is used for dairy cattle for all years in the time series. In the NIR of the previous submission, Portugal had indicated that efforts would be made to generate country-specific DE factors, but this has not been implemented yet. The ERT encourages Portugal to proceed with its plans to develop DE values reflecting the current feed diets in the country in time for its next annual inventory submission.

2. Direct soil emissions – N_2O

71. The figure for consumption of mineral N fertilizers, as reported in the NIR, was derived from data on sales, imports and exports. For the inventory year 2007, Portugal estimated the consumption based on a linear extrapolation of the 2004–2006 consumption data, as the data provider, INE, was expected to publish the official annual consumption for 2007 only in July 2009. The extrapolation resulted in an estimate which is 33 per cent lower than the value corresponding to 2006 and 52 per cent lower than the actual consumption figure finally published by INE in July 2009. The ERT therefore expects a considerable recalculation in the next submission for 2007. For the inventory year 2006, Portugal used updated data to recalculate the emissions from mineral fertilizer, which resulted in a reduction in the estimate of 15.4 per cent. Based on comments from the ERT during the centralized review, Portugal is investigating the possibility of obtaining preliminary consumption data from INE at an earlier date. If this is not possible, the ERT recommends that Portugal improve the estimation procedures for its next annual inventory submission. The ERT encourages Portugal to implement measures to avoid the need for frequent recalculations in the future.

3. Indirect emissions – N_2O

72. Portugal has estimated that 20 per cent of the nitrogen from anaerobic lagoons in the country is discharged directly into water systems. The implied emission factor (IEF) reported by Portugal agrees with the IPCC default value of 0.025 kg N_2O-N/kg N. However, since the IPCC default EF is derived from a combination of emissions occurring from groundwater and ditches (0.015 kg N_2O-N/kg N), water sheets (0.0075 kg N_2O-N/kg N) and estuaries (0.0025 kg N_2O-N/kg N), its use by Portugal may lead to an overestimation of emissions, given that there would not be emissions from groundwater in this case. The ERT recommends that Portugal adopt an EF consistent with dominant practice in the country for its next annual inventory submission.

C. Non-key categories

Manure management – N_2O

73. The distribution of AWMS in the country applied in the Portuguese inventory is based on expert judgement from the Ministry of Agriculture and is predominately a reflection of the situation in 1990. Portugal is aware, however, that the real shares of the different AWMS may have changed since then. In the course of the centralized review, Portugal explained to the ERT that an extensive agricultural survey, beginning in 2009 and conducted by INE, will enable it to monitor the actual situation and future developments. The ERT welcomes Portugal's intention to update this information and recommends that it document in detail the relevant results of this survey in the NIR and use the results in its estimates for the manure management category in its next annual inventory submission.

74. N_2O emissions from AWMS depend on the amount of nitrogen entering the system. For dairy cows Portugal has used a value of Nex of 87.9 kg N/year for all years, in spite of increases in milk yield

and feed consumption of 15–20 per cent over the time series. The default value for Western European conditions is 100 kg N/head/year. The ERT is of the opinion that these values are low considering the level of feed demand reported in the chapter of the NIR on enteric fermentation, as well as in comparison with other countries with similar conditions, leading to a potential underestimation of the emissions for the most recent years. During the centralized review, Portugal explained to the ERT that an update of the Nex value will take place shortly. Acknowledging that this issue had been raised in the previous review report, the ERT encourages Portugal to make efforts to generate verified country-specific values for Nex for all cattle in its next annual inventory submission.

75. For pigs, country-specific Nex data from Laboratório Químico Agrícola Rebelo da Silva in Lisbon are used. As reported in the 2009 submission, the selected value of Nex for pigs is 7.89 kg N/head/year, which is lower than the IPCC default of 20 kg N/head/year given in the Revised 1996 IPCC Guidelines. Portugal has not provided the ERT with sufficient justification for the selected value. The total Nex for pigs reported in the inventory is 18.439 Gg N in 2007. In the *Estatísticas Agrícolas 2008* of INE, the total amount of N from pigs was estimated as 55.936 Gg N for the same year. The ERT recommends that Portugal verify the Nex rates in its next annual inventory submission for all pig types and for each year in the time series and, if needed, revise its estimates accordingly.

V. Land use, land-use change and forestry

A. Sector overview

76. In 2007, net removals from the LULUCF sector amounted to 2,323.84 Gg CO_2 eq. Since 1990, net removals have increased by 3,867.07 Gg CO_2 eq. The only driver for the rise in removals is the increase in carbon stocks in forest land. Within the sector, most of the net removals were in forest land (3,766.52 Gg CO_2 eq), with a marginal amount in grassland (24.74 Gg CO_2 eq). Most of the net emissions were from settlements (1,113.65 Gg CO_2 eq), followed by cropland (214.62 Gg CO_2 eq), wetlands (104.75 Gg CO_2 eq) and marginal amounts from other land and other (32.33 Gg CO_2 eq and 2.07 Gg CO_2 eq, respectively).

77. The representation of land use reported by Portugal is very inconsistent, particularly in relation to land-use changes, as was noted in previous review reports. There is no match between the sum of conversions of one land-use category and the net gain or loss in area of the same category, for example. The conversion of forest land to other land uses has been estimated to be constant throughout the reporting period at 4.01 kha per year, and the conversion of other lands to forest land has also been estimated as a constant value of 9.80 kha per year. However, the increase in forest land area was in a range of 5.88–11.82 kha per year, depending on the period considered. This indicates a clear inconsistency, which has also been identified in all other land-use categories. The ERT recommends that Portugal improve the consistency and accuracy of the reporting of land areas subjected to land-use changes in its next annual inventory submission.

78. The ERT noted that the reporting of areas subject to land-use change, and therefore of the estimates of changes in carbon stocks due to changes in land use, is not in full compliance with the IPCC good practice guidance for LULUCF. The categories of converted land should include all the areas that are in the transition period from one use to another, which by default is 20 years. After the centralized review, Portugal explained to the ERT that the transition period selected was 14 years. The ERT presumes that this period is based on the fact that this is the time interval between the two sets of Corine Land Cover information used. The ERT recommends that Portugal provide justification for its choice of 14 years for the transition period for conversion of lands to forest land or, alternatively, adopt the IPCC default value of 20 years in its next annual inventory submission.

79. Portugal provided a comprehensive inventory of the LULUCF sector. The CRF tables include estimates of CO_2 emissions and/or removals for all six land-use categories, including an adequate use of notation keys. CO_2 emissions from agricultural CaO application was the only category reported as "NE". While the ERT noted an improvement in the quality of reporting over previous submissions, the LULUCF section of the NIR still lacks transparency, particularly in relation to the description of methods used and assumptions made. In particular, the ERT noted the fact that land converted to settlements, which was identified as a key category, has not been described in the NIR. The ERT recommends that Portugal provide a description in its next annual inventory submission of the methods and assumptions used for estimating carbon stock changes associated with all land-use changes, particularly for those that are key categories.

80. Recalculations have been made for the 2009 submission to reflect updated harvest data for the years 2003–2006, but only limited explanations for this have been provided in the NIR, as was also mentioned in previous review reports. The impact of these recalculations was a decrease in the estimate of the CO_2 sink in forest land by 2,170.02 Gg CO_2 eq (38.2 per cent) for 2006. The ERT welcomes the planned improvements related to the methodology and parameters that are described in the NIR (e.g. revision of the carbon content of soils and development of yield tables per age implying a revision of the use of the biomass expansion factors methodology) and encourages Portugal to proceed with their implementation. In particular, the ERT recommends that Portugal increase its efforts to achieve a consistent and accurate representation of the land use in the country, with a view to complying with reporting requirements under the Kyoto Protocol.

B. Key categories

1. Forest land – CO_2

81. Portugal derived the areas of forest land from National Forest Inventories performed in 1982, 1995 and 2005–2006, using an interpolation method and assuming that the areas for 2006 and 2007 were the same as in 2005. The areas for land converted to forest land were derived from Corine Land Cover data, which were available for 1985–1987 and 2000, and have a spatial resolution ranging from 5 to 25 ha. The estimated uncertainty value for the AD is 13.0 per cent for forest land remaining forest land, and ranges between 12.5 and 20.4 per cent for the conversion of other land uses to forest land. However, no explanations were given for how these uncertainties were derived. The assumption of a constant annual rate of conversion of land to forest and the relatively low spatial resolution of the Corine Land Cover data suggest that uncertainties may have been underestimated. Given the high rate of conversion of land to forest land (1.5 per cent of total land converted each year), the ERT recommends that Portugal improve the accuracy of the estimates of forest land areas for its next annual inventory submission.

82. The time series for losses of living biomass carbon stocks does not reflect the strong inter-annual fluctuations in the occurrence of wildfires, with the exception of 2003, which was explicitly mentioned in the NIR as a year with an extremely high incidence of fires. While the ERT acknowledges that Portugal has assumed that a fraction of the wood from forests affected by burning is salvaged, it is clear from the report that most of the biomass affected by burning consists of understorey vegetation and litter, and, therefore, that wood salvaging should not have an impact on smoothing of the time series data set. During the centralized review, Portugal explained to the ERT that understorey vegetation and litter are only accounted for the purpose of estimating non-CO_2 emissions based on the fact that these pools regenerate after a fire event. The ERT acknowledges that this is in compliance with the IPCC good practice guidance for LULUCF, and encourages Portugal to provide a clear explanation of the assumptions underlying the estimates of carbon losses due to fires in its next annual inventory submission.

83. The NIR states that changes in dead organic matter and soil organic carbon (SOC) pools were assumed not to occur in forest land remaining forest land. However, these two pools have been reported showing annual changes, both of low magnitude, in the CRF tables. The dead organic carbon pool showed annual decreases and the SOC pool showed annual increases. However, no explanation is provided in the NIR or in the documentation boxes in the CRF tables. The ERT encourages Portugal to implement the necessary QA/QC measures to correct this inconsistency between what is reported in the CRF tables and the NIR, and to improve the transparency of the calculations for its next annual inventory submission.

2. Biomass burning – CO_2, CH_4 and N_2O[9]

84. For its estimates under the biomass burning category, Portugal made the assumption that 4 per cent of the living biomass of trees is effectively burned when wildfires occur. No references or documentation were provided for the basis of this assumption in the NIR. If this figure is combined with the selected factors for understorey biomass and litter (see para. 82 above), the resulting total fraction of biomass burned is 19.4 per cent. This value is much lower than the default value given in the IPCC good practice guidance for LULUCF (table 3.A.1.12). This may lead to an underestimation of carbon stock losses due to fires and, consequently, of CO_2, CH_4 and N_2O emissions. The ERT recommends that Portugal revise its estimates of the amount of biomass consumed by wildfires in its next inventory submission.

3. Settlements – CO_2

85. Emissions from the settlements category amounted to 1,113.65 Gg CO_2 in 2007, with most of the emissions originating from land converted to settlements, which is one of the most important key categories in the LULUCF sector. For this category, the CRF table 5.D reports net losses in all carbon pools. However, no explanations were given in the NIR or during the centralized review about how these estimates were derived. The ERT recommends that Portugal provide detailed explanations about methods used, assumptions made and emission and carbon stock factors selected, as well as QA/QC measures for reducing uncertainties of this key category, in its next annual inventory submission.

C. Non-key categories

Cropland remaining cropland – CO_2

86. In the cropland category, carbon stock changes in organic soils were reported as "NO" for cropland remaining cropland, in spite of the fact that this category covers nearly one half of the total land area of Portugal and that important changes in SOC should be expected to occur whenever there are changes in practices. Portugal used a single combination of land-use factors of the IPCC tier 1 method (management and input factors) for estimation of carbon stock changes, and this would imply high uncertainty of estimates. The ERT recommends that Portugal disaggregate the area of cropland remaining cropland into several strata corresponding with several combinations of soil types, climate regions, land management and level of carbon inputs, in order to improve the accuracy of estimates of carbon stock changes in this land-use category.

[9] CH_4 emissions from wildfires in forest land remaining forest land are a key category identified by the Party. However, since the calculation procedures for and issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

VI. Waste

A. Sector overview

87. In 2007, emissions from the waste sector amounted to 7,684.63 Gg CO_2 eq, or 9.4 per cent of total GHG emissions. Since 1990, emissions have increased by 29.6 per cent. The key drivers for the rise in emissions are strongly correlated to a change in consumption patterns of the population in the country and to an increase in the collection and disposal of solid waste on land, which reached 100 per cent coverage of the population in 2000. Within the sector, 64.4 per cent of the emissions were from solid waste disposal on land, followed by 35.6 per cent from wastewater handling. Emissions from waste incineration are marginal (0.03 per cent).

88. The information provided in the NIR and the CRF tables is transparent and generally complete. Recalculations have been performed for the waste sector for the entire time series to take account of updated AD (on industrial waste generation and disposal and share of population served by wastewater handling systems), resulting in a 15.2 per cent increase in the estimate of total GHG emissions from the sector in 2006. The emission estimates for 1990 were barely affected (an increase of 0.01 per cent). Implementation of sector-specific QA/QC procedures has not been reported in the NIR for the waste sector. The ERT recommends that Portugal develop a QA/QC procedure for key categories in the waste sector and report on this in its next annual inventory submission.

B. Key categories

1. Solid waste disposal on land – CH_4

89. CH_4 emissions from solid waste disposal on land, a key category by level and trend assessments, amounted to 4,945.39 Gg CO_2 eq in 2007. Within this category, emissions from municipal solid waste and industrial waste are estimated by using the IPCC FOD method and default parameters, except for degradable organic carbon values, which were estimated using country-specific data on waste composition. AD and background information on waste management are well described in the NIR, which also gives an overview of waste management in Portugal. The ERT recommends that Portugal make efforts to use country-specific parameters in the FOD model for its next annual inventory submission.

2. Wastewater handling – CH_4 and N_2O

90. The CH_4 and N_2O emissions from wastewater handling have been recalculated for the present submission, owing to AD on the share of the population served by wastewater handling systems being updated for the entire time series. The estimate of emissions of CH_4 in 2006 increased by 23.6 per cent, and the estimate of N_2O emissions decreased by 0.1 per cent. A country-specific method is used for GHG emission estimates from domestic and commercial wastewater, which is in line with the Revised 1996 IPCC Guidelines.

91. In the 2009 submission no methodological changes have been made in this category, with the exception of the new consideration of CH_4 recovery from wastewater treatment systems following recommendations from the previous review report. Portugal plans to continue improving its knowledge about the situation of the industrial wastewater systems in 1990, because there are no reliable records of the situation existing in this year concerning the treatment systems. The ERT encourages Portugal to undertake this work, which should enable it to make further improvements within the category in its next annual inventory submission.

92. Emissions of N_2O from human sewage were estimated following the methodology from the Revised 1996 IPCC Guidelines and AD on protein consumption taken from FAOSTAT. The ERT

recommends that Portugal use country-specific data on protein consumption and provide background information in the NIR, in order to improve the accuracy and transparency of its estimates in its next annual inventory submission.

C. Non-key categories

Waste incineration – CO_2

93. In Portugal, incineration of municipal solid waste is done in three modern incinerators with energy recovery, so the emissions are included in the energy sector. The incineration of hospital waste occurs without energy recovery, however, and is therefore allocated to the waste sector. Nevertheless, as the methodology applies for both situations, it is presented under the waste sector in order to avoid a repetition of the methodological description. Portugal has correctly reallocated all emissions from incineration of industrial waste from the solid waste disposal on land category to the waste incineration category, as this activity was previously incorrectly classified as open burning of industrial waste on land.

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

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

94. Portugal has reported, on a voluntary basis, supplementary information for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, clearly distinguished from emissions reported from sources included in Annex A to the Protocol. This information was provided on a trial basis in a separate report from the NIR and in two annexes, and gives only partial coverage of lands subject to these activities. The report includes some general information on the activities but focuses on the preliminary studies and measures that Portugal is taking in preparation for its reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol starting in 2010. These studies mainly concern the identification of land units and the estimation of carbon stock changes in forest land, cropland and grassland. A set of CRF tables for reporting activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP-LULUCF tables) was also provided for 2008. The ERT noted that the Party failed to provide KP-LULUCF tables for 1990, which is mandatory for cropland management and grassland management activities under Article 3, paragraph 4, of the Kyoto Protocol, as elected by Portugal. The table NIR-3 on key category identification was not filled in, and no identification of key categories for activities under Article 3, paragraphs 3 and 4, has been reported. The ERT recommends that Portugal include this information in its next annual inventory submission under the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

95. The ERT also noted that the following information was not provided by Portugal: demonstration that carbon pools not accounted for are not sources of GHG emissions; information on factoring out removals from elevated concentrations of CO_2, from nitrogen deposition and from the dynamics of age–class structure; demonstration that the starting date for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is after 1 January 1990 and that they are human-induced; information on how reforestation is distinguished from deforestation; and demonstration that activities under Article 3, paragraph 4, are not included under Article 3, paragraph 3. The ERT recommends that Portugal consider including all of these mandatory information items in its next annual submission under the Kyoto Protocol. The ERT also encourages Portugal to explore the possibility of structuring its reporting in its next annual submission by following in full the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.

96. The ERT noted several areas for improvement in the reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the NIR and the CRF tables, which are briefly described as follows:

(a) In table NIR-1, CH_4 and N_2O emissions from biomass burning were indicated as not reported ("NR"), but they should be either noted as "IE" as CO_2 emissions from biomass burning or as reported "R" if that is the case. Also, litter, dead wood and SOC pools were noted as "NR" for deforestation. These pools should be reported unless it can be demonstrated that they are not sinks;

(b) In table NIR-2, the area of deforestation in 2007 remaining under deforestation in 2008 was noted as not applicable ("NA"). The ERT reminds Portugal that once a unit of land is placed under a land-use category under Article 3, paragraph 3 or 4, of the Kyoto Protocol, it must remain under the same category. Therefore, the corresponding cell should be filled in with an area value;

(c) In table 5(KP), an emission of 411.00 Gg N_2O from cropland management was reported corresponding to 85.49 kha (table NIR-2). This represents an emission of 1,490 t CO_2 eq/ha, which is an extremely high value, suggesting a problem with units in the estimates. The ERT encourages Portugal to implement QA/QC measures for avoiding this type of problem in the future;

(d) In table 5(KP-I)A.1.1, the notation key used for litter, dead wood and SOC pools is "NA"; however, the ERT notes that changes in these pools are possible, and thus recommends that Portugal report the corresponding values or use the notation key "NE" instead. Also, the ERT reminds Portugal that the geographical location of the different areas must be provided;

(e) In table 5(KP-I)B.1 on forest management, the ERT noted that the plus sign of the final estimate indicates an emission when it should be a removal. The ERT recommends that Portugal implement the necessary QA/QC measures to avoid this type of problem. In addition, the ERT notes that blank cells should be filled in with corresponding values or notation keys;

(f) In the accounting table, the ERT notes that a value corresponding to Portugal's cap for accounting removals from forest management should be reported in the appropriate cell.

B. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

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

98. Information on the accounting of Kyoto Protocol 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

[10] The SEF tables 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.

decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

2. National registry

99. 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 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 ERT noted that the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1 is not provided at the registry website.[11] The registry website does refer to information that will be publicly available under European Union registry regulation in future, but the information is not related to the requirements under the Kyoto Protocol. The updates of publicly accessible information announced by Portugal in the response to the SIAR had not been implemented by the time of the preparation of this report. The ERT recommends that Portugal make available the required public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1 through the user interface of its registry and report, in its next annual submission, on any changes to the public information available.

3. Calculation of commitment period reserve

100. Portugal has reported its commitment period reserve in its 2009 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (343,743,774 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.

C. Changes to the national system

101. Portugal has reported no change in its national system since the previous annual submission. However, in the information on improvements provided in the NIR, Portugal documented that additional formal agreements on the provision of confidential industrial data from CSE were made by a decision of the Permanent Body of Statistical Secret. The ERT considers that these additional arrangements represent a change in the national system which should be incorporated in the description of national system changes in Portugal's next annual submission. The ERT concluded that Portugal's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

D. Changes to the national registry

102. Portugal has reported on a change made to its national registry since the previous annual submission concerning an upgrade of the registry software (v1.2.2), and provided the relevant test plans and test reports during the independent assessment of its registry. The ERT recommends that Portugal, in its future annual submissions, include the relevant test plans and test reports for each release of its registry during the reporting period and that it consider the registry reporting guidance agreed by the Registry System Administrators Forum in the independent assessment report (IAR) common operational procedure developed pursuant to decision 16/CP.10. In addition, the ERT recommends that Portugal provide more detail in its next annual submission on changes made to its registry to improve the recovery

[11] <https://rple.pt>.

of its services in the event of a disaster, in accordance with paragraph 32 (j) of the annex to decision 15/CMP.1 and the IAR reporting guidance.

103. The ERT concluded that Portugal'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 decisions 16/CP.10 and 12/CMP.1.

VIII. Conclusions and recommendations

104. Portugal made its 2009 annual submission on 15 April 2009. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, submitted on 20 April 2009, information on Kyoto Protocol units and on changes to the national system and the national registry). Portugal resubmitted its NIR and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol on 27 May 2009. This is in line with decision 15/CMP.1.

105. The ERT concludes that the inventory submission of Portugal has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and Portugal has submitted a complete set of CRF tables for the years 1990–2007 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, particularly in the energy sector (other transportation), the industrial processes and solvent and other product use sectors (actual emissions of PFCs from refrigeration and air conditioning, use of N_2O for anaesthesia, N_2O from fire extinguishers and N_2O from aerosol cans) and the LULUCF sector (CO_2 emissions from agricultural CaO application), were reported as "NE" or "NO". The ERT recommends that the Party provide estimates for these categories in its next annual inventory submission in order to improve completeness, giving priority to missing categories for which the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF provide estimation methodologies.

106. 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. Portugal has not submitted information on minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol on a voluntary basis.

107. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT identified some deviations from good practice that would merit attention by Portugal in its next annual inventory submission, namely: significant inconsistencies in the representation of land use; the use of tier 1 methods for some key categories (e.g. cement production); the use of simple linear forecasts and surrogate data (e.g. for a number of industrial processes categories); and the use of inadequate AD (e.g. for emissions in agriculture sector).

108. The information reported on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol provides only partial coverage of land area and is focused on preliminary studies and measures that Portugal is taking in preparation for mandatory reporting starting in 2010. The Party failed to provide mandatory KP-LULUCF tables for 1990 corresponding to cropland management and grassland management. Also, the information reported by Portugal does not include several mandatory information items as detailed in paragraph 95 above.

109. Portugal 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.

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

111. 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 and the CMP. However, the ERT noted that the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1 is not provided on the registry website and that relevant test plans and test reports for a new software release and detailed information on changes made to improve the recovery of registry services in the event of a disaster, in accordance with the annex to decision 15/CMP.1, were not provided.

112. In the course of the review, the ERT formulated a number of recommendations[12] relating to the transparency and completeness of reporting and the accuracy of the estimates. The key recommendations are that Portugal:

(a) Improve the order and descriptions of the energy sector categories (particularly for transport), following the recommendations of the UNFCCC reporting guidelines in full; state clearly for each category whether recalculations have been performed; include a separate section on international bunkers; and improve the clarity of the division between civil aviation, navigation, military aviation, military navigation, military ground transport, aviation bunkers and marine bunkers;

(b) Develop national sources of AD (e.g. plant-specific data) necessary for estimating emissions from CaO production, NH_3 production and nitric acid production;

(c) Develop country-specific values for feed DE for CH_4 emissions from enteric fermentation and country-specific EF for indirect N_2O emissions from anaerobic lagoons, respectively;

(d) Implement sector-specific QA/QC procedures for the waste sector;

(e) Consider including all mandatory information items on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in its next annual submission, and structuring its reporting by following in full the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website;

(f) Make available through the user interface of its registry the required public information referred to in the annex to decision 13/CMP.1, include the relevant test plans and test reports for each new release of its registry and, in its next annual submission, provide more details on changes made to its registry to improve the recovery of its services in the event of a disaster, in accordance with the annex to decision 15/CMP.1.

113. After the centralized review, Portugal informed the ERT that plant-specific data for CaO production, NH_3 production and nitric acid production will be developed in time for the 2011 annual inventory submission (see para. 112 (b) above).

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

IX. Questions of implementation

114. 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.html>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-ggip.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.html>.

"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 Portugal 2009. Available at <http://unfccc.int/resource/docs/2009/asr/prt.pdf>.

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

FCCC/ARR/2008/PRT. Report of the individual review of the greenhouse gas inventories of Portugal submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2009/arr/prt.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. Teresa Costa Pereira (Portuguese Environment Agency), including additional material on the methodology and assumptions used. The following document was also provided by Portugal:

Instituto Nacional de Estatística (National Statistics Institute). 2009. *Estatísticas Agrícolas 2008 (Agricultural Statistics 2008).* Lisbon: INE. Available at <http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes>.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
CaO	lime
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
DE	digestibility
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
FOD	first-order decay
Gg	gigagrams
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IAR	independent assessment report
IEA	International Energy Agency
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
MgO	magnesium oxide
N	nitrogen
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
NH_3	ammonia
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
NR	not reported
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
UNFCCC	United Nations Framework Convention on Climate Change

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