United Nations FCCC/ARR/2010/PRT

Framework Convention on Climate Change

Distr.: General
11 April 2011

English only

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

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

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2010 annual submission of Portugal, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 6 to 11 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Riccardo de Lauretis (Italy) and Mr. Teemu Oinonen (Finland); energy – Ms. Ana Carolina Avzaradel (Brazil), Mr. Javier González Vidal (Spain) and Ms. Chia Ha (Canada); industrial processes – Mr. Stanford Mwakasonda (South Africa) and Ms. Detelina Petrova (Bulgaria); agriculture – Ms. Junko Akagi (Japan) and Ms. Janka Szemesova (Slovakia); land use, land-use change and forestry (LULUCF) – Ms. Oksana Butrym (Ukraine), Mr. Aquiles Neuenschwander (Chile) and Mr. Atsushi Sato (Japan); and waste – Mr. Qingxian Gao (China), Mr. Pavel Gavrilita (Republic of Moldova) and Ms. Zivile Paskauskaite (Lithuania). Mr. de Lauretis and Mr. Mwakasonda were the lead reviewers. The review was coordinated by Ms. Barbara Muik and Ms. Astrid Olsson (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 2008, the main greenhouse gas (GHG) in Portugal was carbon dioxide (CO_2), accounting for 76.0 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (16.4 per cent) and nitrous oxide (N_2O) (6.3 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.3 per cent of the overall GHG emissions in the country. The energy sector accounted for 70.8 per cent of total GHG emissions, followed by the waste sector (10.1 per cent), the agriculture sector (10.0 per cent), the industrial processes sector (8.8 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 78,381.07 Gg CO_2 eq and increased by 32.1 per cent between the base year[2] and 2008. However, between 2007 and 2008, total GHG emissions decreased by 1.9 per cent.

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

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

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

Table 1

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

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A sources		CO_2	43 589.94	43 589.94	52 997.56	63 691.20	68 285.44	63 797.56	61 523.97	59 544.22	36.6
		CH_4	10 168.10	10 168.10	11 281.90	11 430.04	12 411.19	12 587.63	12 415.02	12 842.54	26.3
		N_2O	5 533.54	5 533.54	5 637.20	5 864.69	5 122.96	4 856.38	4 981.34	4 944.02	–10.7
		HFCs	55.45	NA, NE, NO	55.45	303.44	785.68	873.07	937.79	1 033.42	1 763.6
		PFCs	NA, NO	NA, NE, NO	NA, NO	6.08	9.97	6.55	5.72	9.02	NA
		SF_6	5.34	NA, NE, NO	5.34	5.83	7.12	8.10	7.73	7.85	47.2
KP-LULUCF	Article 3.3[b]	CO_2								4 134.53	
		CH_4								NE, NO	
		N_2O								IE, NE, NO	
	Article 3.4[c]	CO_2	NE							2 441.27	NA
		CH_4	NE							NE, NO	NA
		N_2O	NE							IE, NE, NO	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring, IE = included elsewhere.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

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

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

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

			Gg CO_2 eq								*Change*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A		Energy	40 382.64	40 382.64	48 919.02	59 442.07	63 817.20	59 552.45	56 981.26	55 475.83	37.4
		Industrial processes	4 671.83	4 611.04	5 654.11	6 079.38	6 770.65	6 599.85	6 989.16	6 924.60	48.2
		Solvent and other product use	332.06	332.06	322.58	306.11	306.04	269.84	269.48	264.97	–20.2
		Agriculture	8 038.07	8 038.07	8 028.18	8 675.96	7 984.86	7 850.92	7 944.96	7 836.22	–2.5
		Waste	5 927.76	5 927.76	7 053.57	6 797.75	7 743.59	7 856.21	7 686.70	7 879.46	32.9
		Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
		LULUCF	NA	4 471.53	515.50	–1 400.15	5 258.35	–1 771.56	–2 639.09	–2 957.53	NA
		Total (with LULUCF)	**NA**	**63 763.10**	**70 492.96**	**79 901.13**	**91 880.69**	**80 357.73**	**77 232.48**	**75 423.54**	**NA**
		Total (without LULUCF)	**59 352.36**	**59 291.57**	**69 977.45**	**81 301.28**	**86 622.34**	**82 129.28**	**79 871.57**	**78 381.07**	**32.1**
KP-LULUCF	Article 3.3[b]	Afforestation & reforestation								–2 742.67	
		Deforestation								6 877.20	
		Total (3.3)								**4 134.53**	
	Article 3.4[c]	Forest management								2 563.00	
		Cropland management	NE							–36.19	NA
		Grazing land management	NE							–85.54	NA
		Revegetation	NA							NA	NA
		Total (3.4)	**NE**							**2 441.27**	**NA**

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

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

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

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

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

Table 3
Information to be included in the compilation and accounting database, in t CO_2 eq

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	343 743 774		343 743 774	
Annex A emissions for current inventory year				
CO_2	59 544 224		59 544 224	
CH_4	12 842 541		12 842 541	
N_2O	4 944 019		4 944 019	
HFCs	1 033 415		1 033 415	
PFCs	9 019		9 019	
SF_6	7 854		7 854	
Total Annex A sources	**78 381 074**		**78 381 074**	
Activities under Article 3, paragraph 3, for current inventory year				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–3 762 000		–3 762 000	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	1 019 333		1 019 333	
3.3 Deforestation for current year of commitment period as reported	6 877 200		6 877 200	
Activities under Article 3, paragraph 4, for current inventory year[d]				
3.4 Forest management for current year of commitment period	2 563 000		2 563 000	
3.4 Cropland management for current year of commitment period	–36 190		–36 190	
3.4 Cropland management for base year	NE		NE	
3.4 Grazing land management for current year of commitment period	–85 543		–85 543	
3.4 Grazing land management for base year	NE		NE	
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviation: NE = not estimated.

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

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

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

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

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2010 annual inventory submission was submitted on 15 April 2010; it contains a complete set of common reporting format (CRF) tables for the period 1990–2008 and a national inventory report (NIR). 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, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2010. Portugal resubmitted its CRF tables, NIR and information under Article 7, paragraph 1, of the Kyoto Protocol on 25 May 2010. The annual submission was submitted in accordance with decision 15/CMP.1.

7. In response to questions raised by the expert review team (ERT) during the review (see paras. 96 and 99 below), Portugal submitted additional information covering the reporting of carbon pools and the CRF tables reporting on KP-LULUCF for the base year. Where necessary, the ERT also used the 2009 submission during the review.

8. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

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

Completeness of inventory

10. The inventory is complete in terms of years and covers all source and sink categories for the period 1990–2008, except CO_2 emissions from agriculture lime (CaO) applications, CO_2 emissions and removals from the land-use category grassland remaining grassland and N_2O fugitive emissions from flaring, all of which are reported as not estimated ("NE"). The ERT recommends that Portugal estimate emissions and removals from these categories in its next annual submission giving priority to missing categories for which estimation methodologies are provided in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). Regarding the geographical coverage, the ERT noted that the sum of the land areas given in CRF tables 5.A–5.F excludes land-use changes from the autonomous

[3] The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5 (a), 6 (c) and 6 (k)), under the auspices of the international transaction log administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

regions, Azores and Madeira and that the inventory for KP-LULUCF emission and removal estimation is not complete in terms of geographical coverage. The ERT strongly recommends that Portugal report land use and land-use changes and relevant emissions and removals from the total area of the country in its next annual submission.

11. In the KP-LULUCF tables for cropland management and grazing land management for its base year (1990), Portugal reported with notation keys only. In response to questions raised by the ERT during the review, Portugal provided appropriate verifiable information which demonstrates that a specific carbon pool in the base year is not a net source and the Party provided a detailed plan of actions for conducting the necessary calculations and completing the KP-LULUCF CRF tables for the base year, for its next annual submission. The ERT strongly recommends that Portugal provide the results of these calculations and the verifiable information in its next annual submission.

12. CRF table summary 3 does not include information on methods and emission factors (EFs) used for the estimation of HFC, PFC and SF_6 emissions from the consumption of halocarbons and SF_6. The ERT recommends that Portugal provide this information in its next annual submissions.

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

Overview

13. The ERT concluded that the national system and institutional arrangements continued to perform their required functions.

14. Following recommendations from the previous review, Portugal improved the description of its national system and institutional arrangements by including in its NIR: information regarding access to confidential data; a complete list of institutions involved in inventory preparation and their responsibilities; and a description of the new institutional arrangements established. Portugal also described the changes of its national system since the previous annual submission. These changes are discussed in paragraph 113 below.

Inventory planning

15. The NIR described the national system for the preparation of the inventory. The national system was established through Council of Ministers Resolution 68/2005, which defines the entities relevant for its implementation, based on the principle of institutional cooperation. The Portuguese Environment Agency (APA) has overall responsibility for the national inventory. Other organizations contracted by APA, namely InventAR and Ecoprogresso, are also involved in the preparation of emission estimates, the preparation of the NIR, the compilation of CRF tables and quality assurance/quality control (QA/QC) activities. Other institutions, such as the National Institute of Statistics (INE), the Ministry of Agriculture, the Directorate-general for Geology and Energy and the National Authority for Forestry, have been appointed as sectoral focal points. They are also involved in the preparation, planning and management of the inventory.

16. These sectoral focal points, and in particular the entities involved in the inventory process, contribute to the preparation of the inventory by providing activity data (AD) and support for methodologies and EFs. They play a crucial role in sectoral QA and methodological development. The respective areas of responsibility are listed in the relevant sections of the NIR. Every year APA organizes a kick-off meeting to plan and launch the work for the annual inventory submission. The schedule for inventory preparation includes QA/QC procedures, verification and inventory improvements. Planned

improvements are also included in the methodological development programme (PDM), which is part of the national system. An inter-institutional working group has been put in place as part of the national system, to deal with the additional reporting requirements concerning Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The Council of Ministers Resolution 68/2005 states that all governmental entities involved in the national system have the responsibility to ensure, at a minimum, co-funding of the investments needed to ensure the accuracy, completeness and reliability of the national emission inventory.

17. The ERT identified several recommendations from earlier reviews that had been reiterated in the most recent review report. During the current review Portugal explained that it plans to implement those in the future. The ERT recommends that Portugal report and explain in its next NIR the reasons for any delays in the implementation of planned improvements and include information on the expected timings.

Inventory preparation

Key categories

18. Portugal has reported a key category tier 2 analysis, both level and trend assessment, for the years 1990–2008, as part of its 2010 submission. In addition, the Party 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[4] produced similar results; differences are due to the use of different tiers and different levels of disaggregation of categories.

19. Portugal's tier 2 key category analysis results in the identification of 56 key categories. These include emissions of PFCs from refrigeration and air-conditioning equipment, SF_6 emissions from electrical equipment and HFC emissions from aerosols/metered dose inhalers, which have been identified as key categories on the basis of a qualitative approach. In the NIR, Portugal explained that the result of the key category analysis is used to prioritize the development and improvement of the inventory and it is also important for the development of policies and measures for emissions reduction.

20. In table NIR-3 of the KP-LULUCF CRF, Portugal has identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, both for 1990 and 2008, but the Party did not report the relevant information on the criteria used in its NIR. The ERT recommends that Portugal include this information in its next annual submission, 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

21. Portugal has provided a detailed uncertainty analysis in its 2010 submission. Uncertainty has been estimated using the tier 1 approach for all categories, by gases,

[4] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

including LULUCF categories, in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The overall uncertainty declines over time from 12.3 per cent in 1990 to 9.1 per cent in 2008 due to the different weight of the categories in the years. The uncertainty values, for both AD and EFs, are discussed in the NIR for each category. The ERT encourages Portugal to develop and include country-specific uncertainty values for AD and EFs for key categories and document this in the NIR in its next annual submission.

Recalculations and time-series consistency

22. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. Most of the reported recalculations were carried out following the recommendations from previous reviews or because of updates to AD. The ERT noted that recalculations reported by the Party of the time series 1990–2007 have been undertaken to take into account: (i) in the energy sector, the update of AD due to the revised 2007 energy balance, which affected both combustion and fugitive emissions, and the update of the road transportation emission estimate model (COPERT IV), which resulted in the reduction of N_2O emissions for the whole time series; (ii) in the industrial processes and solvent and other product use sector, the revision by INE of the AD for 2001 to 2007 for lime production, ceramic production, chemical production and food and drink production, which resulted in a decrease of CO_2 emissions; (iii) in the agriculture sector, the update of the livestock time series, crop data for 2006 and 2007 and fertilizer consumption for 2007, as well as the revision of the share of the animal waste management systems and revision of nitrogen (N) excretion rates, which in total resulted in an increase of CH_4 and N_2O emissions; (iv) in the LULUCF sector, a general revision of assumptions and parameters used.

23. The recalculations undertaken in the 2010 submission resulted in a slight increase (0.04 per cent) in estimated total GHG emissions without LULUCF in the base year and a decrease (2.4 per cent) in 2007. For emissions from LULUCF, the recalculations resulted in an increase of emissions in the base year (4.9 per cent) and in a decrease in 2007 (2.9 per cent). The recalculations which contributed most to the decrease in 2007 were the updated CO_2 emissions due to the revision of AD in the chemical industry and solvent and other product use sectors, the updated CH_4 fugitive emissions due to the revised energy balance and the updated N_2O emissions from road transportation due to the use of the COPERT IV model. The rationale for these recalculations is provided in chapter 9 of the NIR, as well as in the sectoral chapters, and in CRF table 8(b). The ERT noted that time-series consistency is not affected by the recalculations.

Verification and quality assurance/quality control approaches

24. The NIR provides an overview of the QA/QC system established as part of the national system, which includes the PDM and an integrated system for the inventory data and information management. The system has been built and updated on the basis of the work done by Ecoprogresso in 2009. The QA/QC system is composed of two main elements: a QA/QC programme and a procedures manual. In the QA/QC programme, generic (tier 1) and specific (tier 2) QC procedures are scheduled and defined in accordance with the IPCC good practice guidance; while the procedures manual describes the general procedures according to the IPCC good practice guidance and how they are adapted to the specific national inventory characteristics. Each public organization that contributes data is responsible for the QC of its own data. The inventory staff are responsible for the implementation of QA/QC procedures, including checks on the processes for acquiring data, checks on calculation procedures, cross-checking of data consistency, technical verification of EFs and comparison of different approaches. Portugal reports category-specific QC procedures and verification activities in its NIR for some categories. The ERT

encourages Portugal to report category-specific QC and verification activities for all categories in accordance with the UNFCCC reporting guidelines in its next annual submission.

Transparency

25. In general, Portugal provides a well-structured and detailed description of methodologies and data sources in the NIR. Transparency has been improved in the 2010 submission and some of the recommendations of previous review reports have been addressed, including an overview in chapter 9 of the NIR on how recommendations from previous reviews have been addressed in the 2010 submission. However, transparency could be further improved, for example, by including additional information regarding the rationale for the choice of AD, parameters and EFs. The NIR could be further improved, for example, by including a separate paragraph on international bunkers and reporting more information about the public electricity generation from municipal solid waste in the energy chapter. The ERT also strongly recommends that Portugal provide all necessary information to support its KP-LULUCF reporting, in accordance with decision 15/CMP.1 (see chapter II.G.1).

26. Portugal generally follows the outline for NIRs, both for the inventory information and supplementary information under Article 7, paragraph 1. QA/QC and verification activities are often not reported in separate paragraphs, but included in the AD and EF paragraphs. AD for the production of some chemicals have been reported as 'confidential' but without resulting in a lack of transparency. Notation keys are used extensively and, in general, correctly. The ERT encourages Portugal to follow the outline of the NIR and to improve the description of methodologies in its next annual submission.

27. The ERT recommends that the Party improve consistency between the information reported in the CRF and in the NIR, especially for the agriculture and LULUCF sectors (see paras. 67, 80, 81 and 86). Although Portugal reported key categories for both 1990 and 2008, for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, in the relevant table NIR 3 of the KP-LULUCF CRF tables, no information on the criteria used to identify them is described in the NIR. In addition, the ERT noted that for 2008 this reporting is not consistent with the results of the key category analysis reported in table A.3 of the NIR. The ERT recommends that Portugal improve the consistency of the information reported in the CRF and in the NIR in its next submission.

Inventory management

28. Portugal has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on key categories and key category identification and planned inventory improvements. APA, which keeps the archive, plans to rebuild the current system because of some limitations to its expansion, especially regarding the storage of large amounts of data. The ERT encourages Portugal to implement the restructuring of the archiving and documentation system in order to resolve the storage capacity problem and to report on the status of changes in its next annual submission.

3. Follow-up to previous reviews

29. Portugal has made a number of improvements in the 2010 submission which reflect recommendations from the previous review reports, such as: the update of AD in the industrial processes sector; the use of the updated COPERT IV model to estimate road transportation emissions; the revision of the share of the animal waste management

systems; the improvement of N excretion rates for dairy cows and swine; and improvements to the transparency of the NIR, including the description of the national system. Moreover, in the NIR, Portugal documented the improvements it has implemented in response to recommendations from previous review reports.

30. The ERT identified a number of recommendations that have not yet been addressed and Portugal explained that it plans to address those in future submissions. These include: providing complete information in table summary 3 of the CRF; including in the NIR a separate section on international bunker fuels; and developing a consistent representation of land use information.

4. Areas for further improvement

Identified by the Party

31. The 2010 NIR identifies several areas for improvement. Portugal indicated that it is working to improve its estimates, as follows:

(a) Implement new estimates of CO_2 from cement production based on the European Union emissions trading scheme (EU ETS) methodology (kiln input-based methodology) in its 2011 submission;

(b) Streamline the collection of AD and emission estimates between the inventory and the EU ETS and improve the integration of AD collected in the inventory and in other surveys such as the European Large Combustion Plants (LCP) directive, the European Pollutant Release and Transfer Register (E-PRTR) (which has replaced the European Pollutant Emission Register (EPER)), the EU ETS and the energy surveys performed annually to produce the energy balance;

(c) Estimate emissions from the use of carbonates in the production of N fertilizer;

(d) Estimate emissions from closed coal mines;

(e) Improve estimates of fugitive emissions in refineries;

(f) Use a higher-tier method for calculating fugitive emissions from gas distribution and transmission;

(g) Improve the AD in some industrial processes categories, such as glass production, iron and steel production and ferroalloys production;

(h) Obtain plant-specific EFs for nitric acid production;

(i) Incorporate additional sources of fluorinated gases (F-gases) in the inventory;

(j) Improve the AD for N fertilizer;

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

(l) Improve the information on industrial wastewater, based on the implementation of a new survey system and database by the National Water Institute.

Identified by the expert review team

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

(a) Increase the completeness of reporting by including estimates for categories reported as “NE”, 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 with country-specific EFs and parameters for key categories and increase the consistency by replacing the use of surrogate or forecast data with national statistics in the industrial processes sector;

(c) Enhance the transparency of reporting by improving the description of international bunkers estimates, reporting in the NIR category-specific QC and verification activities for all categories, including the rationale for the choice of AD, parameters and EFs in the agriculture sector, and including the description of methods and assumptions made for estimates in the LULUCF sector;

(d) Enhance the completeness and transparency of the reporting of KP-LULUCF by completing the calculations for 1990, reporting consistent land area representation figures and calculating carbon stock changes for the unaccounted pools or providing a clear description that these pools are not net sources of GHG emissions.

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

B. Energy

1. Sector overview

34. The energy sector is the main sector in the GHG inventory of Portugal. In 2008, emissions from the energy sector amounted to 55,475.83 CO_2 eq, or 70.8 per cent of total GHG emissions. Since 1990, emissions have increased by 37.4 per cent. The key drivers for the rise in emissions are emissions from transport, energy industries and fugitive emissions from oil and natural gas, which increased by 90.7 per cent, 20.0 per cent and 372.7 per cent, respectively. Within the sector, 34.8 per cent of the emissions were from transport, followed by 34.6 per cent from energy industries, 18.4 per cent from manufacturing industries and construction and 9.6 per cent from other sectors. Fugitive emissions from oil and natural gas accounted for 2.4 per cent. The remaining 0.2 per cent were from the category other.

35. Overall, the inventory for the energy sector is reported in a transparent manner. Emissions have been estimated and reported for almost all categories, except for N_2O from venting and flaring, which is reported as "NE". Descriptions of the methods used, sets of EFs, energy content values and the energy balance have been included in the NIR.

36. However, the ERT considers that the transparency in the NIR could be improved, particularly with regard to public electricity generation from municipal solid waste, which is not mentioned in the energy sector, and with regard to mobile combustion. The ERT noted that, for mobile combustion, the split between domestic and international aviation and navigation is not in line with the Revised 1996 IPCC Guidelines, in terms of the energy balance that is used for the reference approach and reported to the International Energy Agency (IEA). The ERT recommends that Portugal improve the consistency and transparency of its NIR in its next annual submission by improving the description of the energy sector categories, particularly by including municipal solid waste incineration facilities for electricity production in the energy chapter and using an energy balance that is consistent with the IPCC good practice guidance.

37. During the review, Portugal informed the ERT about planned improvements that will improve the transparency and accuracy of future submissions. These include:

(a) Including a separate section on international bunkers;

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

(c) Establishing a close cooperation with the national authority responsible for the energy balance to develop it in a manner that is consistent with the IPCC good practice guidance, especially regarding the international bunkers. This will reduce the differences between the reference and the sectoral approaches;

(d) Thoroughly revising emission estimates for iron and steel for the next annual submission;

(e) Enhancing the use of EU ETS data for large power plants, including the work which is being done to streamline the collection of data and emission estimates between the inventory and the EU ETS;

(f) Performing a time-series consistency analysis for fugitive emissions from oil refining activities.

38. The ERT commends Portugal for performing a comparison between the energy balance and the IEA information as a QA/QC analysis and for implementing the COPERT IV model for the road transportation category.

39. Recalculations were performed for most categories, mainly to take into account updates of fuel consumption 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 and energy balance data. In this regard, the ERT encourages Portugal to make use of the EU ETS verified data as well as the E-PRTR. The ERT recommends that the Party reflect all these procedures under the heading "category-specific QA/QC and verification".

2. Reference and sectoral approaches

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

40. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2008, there is a difference of 0.54 per cent between the two estimates. Explanations are provided in the documentation box of CRF table 1.A(c) and in the NIR. The latter provides explanations for the fluctuations in the differences between the two approaches over the years. These differences have decreased in 2007 and 2008 due to some adjustments made to the energy balances of those years. The ERT commends Portugal for this improvement and encourages Portugal to apply the same approach to the entire time series. According to the NIR, the main reason for the differences is that the energy balance data used for the reference approach classifies fuel sales for aviation and navigation into domestic and international, according to the flag of the aircraft and vessel (statistics from General Directorate of Energy and Geology), whereas data used in the sectoral approach are based on detailed flight and maritime movements and aircraft operation characteristics. The ERT noted that Portugal is working to improve the consistency between the energy balance and the Revised 1996 IPCC Guidelines and IPCC good practice guidance.

41. The apparent consumption reported to the UNFCCC for Portugal is within 8 per cent of that reported to the IEA, with data in later years tending to be closer; the IEA values are systematically lower than the values reported to the UNFCCC. Portugal included a chapter in the NIR with a comparison between IEA values and its energy balance: some discrepancies were found and possible explanations were given. Portugal expects to

improve this analysis in the next annual submission. The ERT commends the Party for these efforts and encourages Portugal to follow this approach.

International bunker fuels

42. Portugal reports in the NIR that emissions from aviation bunkers are estimated using a tier 2a method. The figures in the NIR for fuel consumption for international aviation and navigation differ from those reported in the reference approach and to the IEA. Since the General Directorate of Energy and Geology reports directly to the IEA, discrepancies between these data and the Party's estimates are expected. Portugal also informed the ERT that it is making efforts to bring the split between domestic and international fuel consumption into line with the IPCC good practice guidance. The ERT welcomes this planned improvement and recommends that, in the NIR of its next annual submission, Portugal document the results of its efforts to achieve a split between domestic and international fuel consumption in the reference approach that is fully consistent with the IPCC good practice guidance.

43. The reporting of international bunkers is not transparent, because the NIR does not include a section on international bunkers, but only gives short notes in the sections covering civil aviation, navigation and fisheries. This is not in line with the UNFCCC reporting guidelines. Portugal plans to include a separate section on international bunkers in the NIR of its next annual submission and to provide transparent descriptions in this section of how the estimates of emissions from bunker fuels are obtained.

Feedstocks and non-energy use of fuels

44. As in previous submissions, 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. Portugal informed the ERT that it will try to improve this category in the near future, making use of the AD that are already available and the 2006 IPCC Guidelines. 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 submission.

3. Key categories

Road transportation: all fuels – CO_2, CH_4 and N_2O

45. For the first time, Portugal has used the COPERT IV model to estimate the emissions from road transportation. CO_2 emission estimates are based on a tier 2 method and non-CO_2 emissions are based on a tier 3 method. As a result of this methodological change, N_2O emission estimates have been reduced significantly, resulting in a reduction of around 60 per cent in 2007 compared with the previous submission. Portugal has used country-specific information, where available (e.g. net calorific value, fleet, distance travelled), and default values where country-specific information is not available (e.g. average trip length). The ERT welcomes this improvement and recommends that Portugal justify in the NIR that the default parameters used are appropriate or develop country-specific values.

Stationary combustion: gas, liquid – CO_2

46. CO_2 emissions from agriculture/forestry/fisheries increased 37.4 per cent between 2007 and 2008. Portugal informed the ERT that this results from an increase in the diesel oil consumption in agriculture, as reported in the energy balance, as a consequence of a

reclassification of fuel consumption from some categories. The ERT encourages Portugal to investigate this issue and, if necessary, make the appropriate changes to ensure consistency throughout the time series in its next annual submission.

Oil and natural gas: Oil – CO_2

47. The ERT identified significant fluctuations in the trends of CO_2 emissions from refining and storage; the inter-annual changes of CO_2 emissions for 1991/1992, 1993–1997, 1999–2001 and 2002/2003 range from –12.8 per cent to 400.2 per cent. Portugal informed the ERT that it is making efforts, together with the refineries, to improve emission estimates of storage in tanks, fugitive emissions, catalysts regeneration, and sulphur recovery. These will be used to improve the inventory methodologies and EFs for the coming years after the application of validation procedures. The ERT recommends that Portugal improve the time-series consistency in this category and encourages Portugal to document the results of its efforts in the NIR of its next annual submission.

Oil and natural gas: Natural gas – CH_4

48. The ERT identified significant fluctuations in the trends of CH_4 emissions from natural gas transmission between 1997 and 2008, ranging from –69.6 per cent to 207.6 per cent. Portugal explained in the NIR that the main fluctuation occurs from 2003 onwards, mainly due to the inclusion of cushion gas in the estimates and the expansion of the natural gas distribution network. The decline in emissions from 2004 to 2007 is the result of a stabilization in the pipeline extension in the residential and services sectors coupled with improvements in pipeline quality and other general gains in efficiency. The increase in 2008 resulted mainly from corrections to the reported values for natural gas losses. The ERT recommends that Portugal investigate this issue further, ensuring time-series consistency, and document its findings in its next annual submission.

4. Non-key categories

Other: liquid fuels – CO_2, CH_4 and N_2O

49. Emissions from military navigation and military ground transport are not mentioned in the NIR. Portugal informed the previous ERT that these emissions are included under navigation and road transportation. To increase transparency, the ERT reiterates the recommendation that, in the NIR of its next annual submission, Portugal either provide information to clarify the inclusion of these emissions or obtain the data necessary to estimate and report emissions from military navigation and military ground transport separately.

C. Industrial processes and solvent and other product use

1. Sector overview

50. In 2008, emissions from the industrial processes sector amounted to 6,924.60 Gg CO_2 eq, or 8.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 264.97 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since the base year, emissions have increased by 48.2 per cent in the industrial processes sector, and decreased by 20.2 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 in mineral products, consumption of halocarbons and SF_6 and chemical industry. Within the industrial processes sector, 66.8 per cent of the emissions were from mineral products, followed by 17.8 per cent from chemical industry, 15.2 per cent from consumption of halocarbons and SF_6, and 0.2 per cent from metal production.

51. The inventory of the industrial processes and solvent and other product use sector is generally complete. 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 recommends that Portugal investigate whether PFCs are used in refrigeration and air conditioning. If they are, the ERT recommends that Portugal estimate actual emissions of PFCs and if not, change the notation key to "NO" for potential emissions in its next annual submission. However, the ERT recommends that the Party ensure that all potential emissions are covered in its inventory.

52. Portugal has made considerable efforts to improve its AD by using national sources, such as surveys by INE, instead of simple forecasts. Improvements have been made to emission estimates for lime production, limestone and dolomite use, ammonia production, nitric acid production and organic chemical industry for the years 2001–2007. However, the ERT noted that the Party still used simple linear forecasts and surrogate methods to calculate AD for glass production, iron and steel and ferroalloys production. The ERT welcomes the implemented improvements, but reiterates the recommendation from the previous review that Portugal develop national sources of AD or use the plant-specific data necessary for estimating emissions of all categories in the industrial processes sector and that it ensure time-series consistency in its next annual submission.

2. Key categories

Cement production – CO_2

53. Data on clinker production for the period 1990–2008 were received by the Party directly from each industrial plant. Portugal used the tier 2 methodology to estimate emissions from this key category. However, the Party used the default EF (0.507 t CO_2/t clinker) based on the default CaO fraction in clinker (64.6 per cent). During the review, the ERT was informed that Portugal will implement new estimates based on the EU ETS methodology (kiln input-based methodology) in its 2011 submission. The ERT welcomes this planned improvement and recommends that Portugal report its emission estimates accordingly in its next annual submission.

Lime production – CO_2

54. Portugal has made considerable efforts to improve the AD used for emission estimates for lime production for the years 2001–2007, based on surveys by INE. However, AD for 2008 were estimated again using a simple linear forecast. The ERT recommends that Portugal make efforts to continue using the statistical data for the most recent year or obtain plant-specific data and report its emission estimates accordingly in its next annual submission.

Ammonia production – CO_2

55. There is only one industrial plant for ammonia production in Portugal. Therefore, the AD and EFs are reported as confidential for this category. CO_2 emissions were estimated from feedstock consumption (vacuum residual fuel oil) for the period 1990–1994 and an average feedstock/ammonia production ratio for the period 1994–2007. However, AD for 2008 were estimated using a simple linear forecast. During the review, the ERT was informed that Portugal plans to obtain AD directly from the plant. The ERT welcomes this planned improvement and recommends that Portugal report its emission estimates accordingly in its next annual submission.

3. Non-key categories

Nitric acid production – N_2O

56. Nitric acid is produced in three industrial plants in Portugal. For all years, the AD and EFs are reported as confidential for this category. During the review, the ERT was informed that the country-specific EF used in emission estimates is based on monitored data from one of the three existing production units for 2001 and that the EF was assumed to be similar for the other units. The ERT recommends that Portugal derive country-specific EFs that are appropriate for all production units, and report on them in its next annual submission.

57. The ERT welcomes Portugal's efforts to update the AD from INE for the period 2001–2007. However, AD for 2008 were estimated using a simple linear forecast. During the review, the ERT was informed that Portugal plans to obtain AD directly from the production units. The ERT welcomes this planned improvement and recommends that Portugal report its emission estimates accordingly in its next annual submission.

Iron and steel production – CO_2

58. The ERT noted that AD for estimating emissions from iron and steel production is mainly based on interpolated or proxy data. The ERT encourages Portugal to make efforts to find appropriate statistical data for the whole time series or to use plant-specific data and report its emission estimates accordingly in its next annual submission.

D. Agriculture

1. Sector overview

59. In 2008, emissions from the agriculture sector amounted to 7,836.22 Gg CO_2 eq, or 10.0 per cent of total GHG emissions. Since the base year, emissions have decreased by 2.5 per cent. The key driver for the emission trend is the decrease of N_2O emissions caused by a decreasing use of synthetic fertilizers in agricultural practice. Within the sector, 37.7 per cent of the emissions were from enteric fermentation, followed by 36.5 per cent from agricultural soils, 20.3 per cent from manure management and 4.9 per cent from rice cultivation. The remaining 0.5 per cent were from field burning of agricultural residues.

60. The CRF tables for 2008 include estimates for most gases and categories from the agriculture sector, as recommended by the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Portugal used the notation key "NE" to report CH_4 emissions from agricultural soils, both direct and indirect emissions, in its CRF tables for 2008 due to the lack of EFs in the IPCC good practice guidance.

61. The Party's NIR is mostly transparent in all major categories and gases and, due to the inclusion of results from national studies and expert work, the transparency has increased since the last submission. The ERT noted that the structure of the agricultural chapter of the NIR is in line with the UNFCCC reporting guidelines. However, the ERT recommends that Portugal provide more recent information on the AD and EFs used within the sector, including the rationale for their selection and information to justify the use of country-specific parameters and methods in its next NIR.

62. Portugal used a tier 2 methodology for estimating emissions of all key categories in the agriculture sector using country-specific EFs. Portugal used a tier 1 methodology and default values for the uncertainties of AD and EFs by categories to calculate total sectoral uncertainty. The ERT encourages Portugal to develop and include country-specific uncertainty values for AD and EFs for the key categories and document them in the NIR.

63. Portugal performed several minor recalculations in its 2010 submission. The update of 2007 data for livestock, crop data and use of fertilizers in national statistics led to minor changes in emissions. The revision of N excretion rate, as recommended by the previous ERT, was performed for all key animal categories and the recalculations had an impact on N_2O emissions from manure management and agricultural soils. The ERT noted that these recalculations improved the time-series consistency and the quality of the inventory. The total effect of recalculations is an increase of emissions of 7.2 per cent in 2007 and a decrease of 1.8 per cent in the base year (1990).

64. The ERT noted that several recommendations from previous ERTs had not been followed, including: developing a country-specific EF for indirect N_2O emissions from anaerobic lagoons; developing country-specific values for feed digestibility for cattle in enteric fermentation; and implementing measures to avoid the need for frequent recalculations of consumption of mineral N fertilizers in the future. The ERT reiterates these recommendations and recommends that the Party document these revisions in its next annual submission, including any recalculations undertaken and their impact on the time-series consistency and the emission trend.

2. Key categories

Enteric fermentation – CH_4

65. Portugal used a tier 2 methodology and country-specific EFs to estimate CH_4 emissions from enteric fermentation for dairy cattle, non-dairy cattle, sheep, goats, rabbits and swine. The Party used a tier 1 methodology and default EFs to estimate CH_4 emissions from horses, and mules and asses. The ERT noted that the methodological approach is in line with the IPCC good practice guidance and comparable with methods used in other developed countries.

66. The CH_4 implied emission factor (IEF) for non-dairy cattle in 2008 (57.47 kg/head/year) is 2.4 per cent higher than the 2007 value, higher than the IPCC default value for Western Europe (48 kg/head/year) and higher than the upper range of IPCC default values (56 kg/head/year). The ERT noted that the information provided in the NIR is not sufficient to justify this EF. During the review, Portugal provided additional documents explaining the background data used for calculating the EFs for the last ten years. The ERT recommends that Portugal include these detailed background data for its EF calculation for the whole time series in the next NIR to improve transparency. Furthermore, the ERT recommends that the Party include similar information for the sheep EF estimation in its next NIR.

67. The ERT noted several inconsistencies between the NIR and the CRF for dairy cattle (methane conversion rate, Y_m), and for non-dairy cattle and sheep (units of EFs); and also in the recalculations reported in the NIR (recalculation of poultry in enteric fermentation has no impact on emissions in this category). The ERT recommends that Portugal improve its QC activities to ensure consistent reporting between the NIR and the CRF tables.

68. The ERT reiterates the encouragement from the previous review report that Portugal develop and implement country-specific digestibility values reflecting the current feed diets for dairy cattle in the country.

Manure management – CH_4

69. Portugal identifies emissions from swine as the most significant source of CH_4 emissions in manure management, with a share of 83 per cent in 2008, and the Party estimated emissions using the tier 2 methodology and a country-specific EF in line with the IPCC good practice guidance. The ERT welcomes the transparent documentation in the

NIR of the country-specific parameters used for estimating CH_4 emissions from manure management.

70. The CH_4 IEF for swine reported by Portugal for 2008 (21.42 kg/head/year) is much higher than the IPCC default value for Western Europe, temperate climate (10 kg/head/year) and higher than the IPCC default value for Western Europe, warm climate (19 kg/head/year). During the review Portugal explained that the difference between the default and the country-specific EF is due to the specific agricultural praxis for swine in Portugal. Manure is usually treated in anaerobic lagoons (84.5 per cent of the share), which show the highest CH_4 conversion factor among all management systems. The ERT recommends that Portugal provide this information in its next annual submission to improve transparency.

Rice cultivation – CH_4

71. Portugal estimated CH_4 emissions from flooding of rice paddies using regional-specific EFs, based on a national study. The methodology, which follows the IPCC good practice guidance, and the parameters used by Portugal are comparable with those of other similar countries, such as Italy.

72. The ERT noted that the reported uncertainties for the EF used (40 per cent) and AD (40 per cent) of rice cultivation are high and do not seem to properly reflect the national methodology. The ERT encourages Portugal to re-evaluate the uncertainty of emissions in this category by taking into account the uncertainties of the country-specific parameters.

Direct soil emissions – N_2O

73. Portugal estimated direct N_2O emissions from all major sources and described its estimates in the NIR in line with IPCC good practice guidance. Portugal followed recommendations from previous review reports by improving the time-series consistency of its AD. Nevertheless, the ERT further recommends that Portugal investigate the possibility of obtaining preliminary consumption data from INE at an earlier date and implement measures to avoid the need for frequent recalculations in the future.

Indirect soil emissions – N_2O

74. The ERT welcomes the efforts of Portugal to improve the transparency in its reporting of indirect soil emissions, in accordance with the recommendations of the previous review report and acknowledges that Portugal used the 2006 IPCC Guidelines as a reference supporting the national methodology.

75. The ERT noted that N_2O emissions from the liberation of carbon from organic matter when soil is converted to cropland are reported in the agriculture sector in CRF table 4.D, but the description is included in the LULUCF sector in the NIR (pages 7–19). The ERT recommends that Portugal reallocate these emissions to the LULUCF sector, in line with the IPCC good practice guidance for LULUCF and document this in the NIR.

3. Non-key categories

Manure management – N_2O

76. Portugal identified solid storage and dry lot as the major source of N_2O emissions (94 per cent of the share) among all manure management systems in the country and poultry as the most significant animal category.

77. The ERT welcomes the efforts made by Portugal to improve the estimates of N_2O emissions from manure management since its last submission. Following the

recommendation of the previous review report, Portugal re-evaluated country-specific N excretion rates for all animal categories and subcategories and recalculated N_2O emissions for the whole time series, including new information about the percentage of manure in animal waste management systems.

78. However, the ERT reiterates the recommendation from the previous review report that Portugal verify and justify the N excretion rate for swine, which is lower than the IPCC default value and that Portugal provides information on this verification and justification in its next submission.

E. Land use, land-use change and forestry

1. Sector overview

79. In 2008, net removals from the LULUCF sector amounted to 2,957.53 Gg CO_2 eq. Since the base year, 1990, this sector has changed from being a net source (4,471.53 Gg CO_2 eq) to a net sink. The main driver for the rise in removals was the increasing carbon stocks in living biomass in forest land. Emissions from burning biomass in forest land have strongly decreased from 3,499.11 Gg CO_2 in 1990 to 176.66 Gg CO_2 in 2008. Within the sector, forest land is the main sink, with net removals of 4,590.88 Gg CO_2, while other removals occur in grassland, accounting for 24.74 Gg CO_2. Settlements are the major source of emissions, accounting for 1,113.65 Gg CO_2, followed by emissions from cropland (190.38 Gg CO_2) and wetlands (104.75 Gg CO_2). The remaining 32.33 Gg CO_2 were from other land. CH_4 and N_2O emissions are reported, as in previous submissions, only for biomass burning, and are insignificant compared with total CH_4 and N_2O emissions.

80. The ERT noted that the representation of land remains a problematic issue, particularly in relation to land-use change, 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 56.18 kha per year, and the conversion of other lands to forest land has also been estimated as a constant value of 137.17 kha per year. The increase in forest land area was in a range of 0.00–19.04 kha per year, depending on the period considered. This indicates a clear inconsistency, which has also been identified in all other land-use categories. Furthermore, the land-use change matrix presented in table 7.24 of the NIR is not consistent with the CRF information. The ERT strongly recommends that Portugal improve the consistency and accuracy of the reporting of land areas subject to land-use change in its next annual submission.

81. The total area of Portugal is not mentioned in the NIR, but the sum of the areas given in CRF tables 5.A to 5.F amounts to 9,035 kha. During the review, the Party informed the ERT that the total land area of Portugal is around 9,220.7 kha, including the two autonomous regions which total 312.3 kha (Azores, 232.2 kha and Madeira, 80.1 kha), and that the 2010 submission excludes land-use changes from these islands. Nevertheless, in NIR table 7.7, total forest land area includes both mainland and the autonomous regions of Portugal. This results in a difference between total forest land area in NIR table 7.7 and the CRF table 5.A from 2001 to 2008. As in the previous review, the ERT strongly recommends that the Party report land use from the total area of the country, in order to increase completeness.

82. The CRF tables include estimates of emissions and removals for most gases and categories from the LULUCF sector. The ERT noted that CO_2 emissions from agricultural lime application and the land-use category grassland remaining grassland were reported as "NE", and no explanations are provided. The ERT recommends that Portugal estimate and report all mandatory categories currently reported as "NE".

83. The LULUCF section of the NIR still lacks transparency, particularly in relation to the description of methods, assumptions and data sources for estimating carbon stock changes associated with all land-use changes. The ERT also noted that the results of and justifications for recalculations are not always provided at a sufficient level of detail and that sector-specific information on QA/QC procedures is not provided in the NIR. The ERT recommends that Portugal increase the transparency of its reporting by providing the above mentioned reporting elements in its next annual submission.

84. The ERT noted that almost all reported land-use conversions are constant throughout the time series 1990–2008. During the review, Portugal informed the ERT that the main source of information on land-use change is the CORINE Land Cover programme for the years 1985/86/87 and 2000, and that a land cover cartography for 2007 is being prepared and validated in order to obtain a consistent time series. The ERT strongly recommends that Portugal reassess the areas for all land use categories in its next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

85. The ERT noted that Portugal neither updated nor provided explanations for the uncertainty values reported for AD for forest land remaining forest land (13.0 per cent) and for the conversion of other land uses to forest land (12.5-20.4 per cent) as was highlighted in the previous review report. The ERT reiterates the finding of the previous ERT that the assumption of a relatively high constant annual rate of conversion of land to forest (1.5 per cent of total land converted each year) and the relatively low spatial resolution of the areas for land converted to forest land suggest that uncertainties may have been underestimated. The ERT also reiterates the recommendation that Portugal improve the accuracy of the estimates of forest land areas for its next annual submission.

86. The NIR states that changes in dead organic matter were assumed not to occur in forest land remaining forest land. However, in the CRF tables this pool has been reported showing annual changes of low magnitude. The ERT recommends that Portugal implement the necessary QC measures to avoid inconsistencies between the CRF tables and the NIR in its next annual submission.

Land converted to forest land – CO_2

87. The net carbon stock changes in living biomass per hectare (0.90 t C/ha), in dead organic matter per area (–0.065 t C/ha) and in mineral soils per area (0.31 t C/ha) for land converted to forest land are kept constant over the whole time series, based on a comparison of data for 1986 and 2000 (14 years). During the review, the Party indicated that these data will be revised in the future based on new cartographic products, in order to update the carbon stock factors and the AD. The ERT welcomes these plans and recommends that Portugal revise the time series information and the matrix of land-use changes with several key time points in line with the IPCC good practice guidance for LULUCF.

Settlements – CO_2

88. Emissions from settlements amounted to 1,113.65 Gg CO_2 in 2008, 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, Portugal reports net losses in all carbon pools. However, although this category is identified as key, no explanations were given in the NIR or documentation boxes about how these estimates were derived. The ERT recommends that Portugal provide detailed explanations about the 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 submission.

3. Non-key categories

Cropland remaining cropland – CO_2

89. In its NIR, Portugal states that the emissions and removals estimates for the vast majority of cropland remaining cropland are not estimated, as they are considered to be in equilibrium and are not considered to be major sources of emissions/removals. The ERT reiterates the recommendation from previous ERTs 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.

F. Waste

1. Sector overview

90. In 2008, emissions from the waste sector amounted to 7,879.46 Gg CO_2 eq, or 10.1 per cent of total GHG emissions. Since the base year, emissions have increased by 32.9 per cent. The key drivers for the rise in emissions were the steady increase in consumption patterns of the population, as well as an increase in the collection and disposal of solid waste on land, which reached 100 per cent of waste generated in 2000. Within the sector, 62.4 per cent of the emissions were from solid waste disposal on land, followed by 37.6 per cent from wastewater handling. The remaining 0.03 per cent were from waste incineration.

91. The information provided in the NIR and CRF tables is generally complete and transparent. Although Portugal has added a sub-section on QA/QC and verification, the implementation of sector-specific QA procedures has not been reported in the NIR for the waste sector.

2. Key categories

Solid waste disposal on land – CH_4

92. CH_4 emissions from solid waste disposal on land amounted to 4,916.46 Gg CO_2 eq in 2008. Within this category, emissions from municipal solid waste and industrial waste are estimated by using the IPCC first order decay (FOD) method and default parameters, except for degradable organic carbon, which was estimated using country-specific data on waste composition. The ERT reiterates the recommendation from the previous review report that Portugal explore the use of country-specific parameters in the FOD model for its next annual submission. The ERT noted that changes in emission trends are not well explained in the NIR and recommends that Portugal provide this information in its next NIR.

Wastewater handling – CH_4 and N_2O

93. CH_4 emissions from wastewater handling amounted to 2,393.71 Gg CO_2 eq in 2008. Portugal had encountered difficulties in its efforts to improve the AD for industrial wastewater. The ERT encourages Portugal to continue its efforts to improve the information on industrial wastewater based on the implementation of a new survey system and database by the National Water Institute.

94. N_2O emission estimates for industrial wastewater are based on an EF from the CORINAIR/EMEP Handbook because no IPCC methodology is available. This EF is not specifically for industrial wastewater; it assumes that the N content of industrial wastewater is similar to that of urban wastewater. Portugal is planning to improve the estimation by collecting information on the total load of N in industrial effluents. N_2O emissions from human sewage were estimated according to the default methodology of the Revised 1996 IPCC Guidelines, assuming that all sewage N is discharged into aquatic environments, and not counted with the N_2O emissions relating to land disposal and sewage treatment. AD on protein intake was taken from the Food and Agriculture Organization of the United Nations (FAO) database 2009. The ERT recommends that Portugal make efforts to obtain country-specific N_2O EFs and data on protein intake and use these data in its calculations in the next annual submission.

3. Non-key categories

Waste incineration – CO_2

95. CO_2 emissions from municipal solid waste incineration occur in three modern incinerators with energy recovery, and were reported in the energy sector. CO_2 emissions from hospital waste incineration without energy recovery are allocated to the waste sector. This is in line with the Revised 1996 IPCC Guidelines. However, as the methodology applies to both situations, it is presented in the NIR under the waste sector in order to avoid repetition of the methodological description. For transparency, the ERT recommends that, in its next annual submission, Portugal specify the amount of emissions that are coming from waste incineration and are accounted for in the energy sector.

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

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

Overview

96. Portugal has elected to account for forest management, cropland management and grazing land management as land use activities under Article 3, paragraph 4, of the Kyoto Protocol, for the first commitment period. The Party has chosen to account for activities under Article 3, paragraphs 3 and 4, at the end of the commitment period. Although Portugal has elected cropland management and grazing land management, it reported most of the KP-LULUCF CRF tables for its base year (1990) using the notation keys "NE" and "NO" only. In response to questions raised during the review, Portugal recognized that its 2010 submission on KP-LULUCF was provisional and incomplete in many respects and did not include the total area of the country. Therefore, the Party declared its intention to completely revise the KP-LULUCF reporting emission estimates as soon as the new cartographic products, currently under preparation, are available. Moreover, Portugal informed the ERT that it is working on determining time series numerical data since 1990, for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The carbon soil pool will be estimated using national information from the available soil study, applied to the land-use change matrix established from the cartographic COS (Cartografia de Ocupação do Solo) products for 1990 and 2007. The ERT strongly recommends that Portugal complete the calculations for 1990 and report these in its next annual submission.

97. The ERT noted several inconsistencies between the land areas reported in the KP-LULUCF CRF tables. In particular, for 2008, areas reported in table NIR-2 for afforestation and reforestation, deforestation and forest management are different from the

areas reported for these activities in the respective background tables. The ERT strongly recommends that Portugal correct these differences in its next annual submission.

98. In the NIR, Portugal has not included information required by paragraph 6(a) of the annex to decision 15/CMP.1 (i.e. information referring to how inventory methodologies have been applied taking into account the IPCC good practice guidance for LULUCF). During the review, Portugal stated that it will include a list or table highlighting the differences between the Convention and the KP-LULUCF inventories in its next annual submission. The ERT recommends that, in its next NIR, Portugal report information on how the IPCC good practice guidance for LULUCF has been taken into account in the methodologies to estimate emissions and removals, including the differences between the Convention and the KP-LULUCF inventories.

99. In CRF table NIR-1 the calculations for the carbon pools litter, dead wood and soil for all activities under Article 3, paragraph 3, were reported as "NE", and not reported "NR" for activities under Article 3, paragraph 4 (except the soil pool for cropland management and grazing land management, which is reported as reported, "R"). The ERT draws the Party's attention to the requirement of paragraph 6(e) of the annex to decision 15/CMP.1, which states that a Party shall provide verifiable information which demonstrates that any unaccounted pool is not a net source of anthropogenic GHG emissions. During the review Portugal stated that, because it lacks complete, assembled and analyzed information, for its 2010 submission, it would be preferable to choose, as an interim method, tier 1 default assumptions for these carbon pools, which assume that there is no need to estimate the carbon stock changes for these pools. Moreover, Portugal has stated that it is making efforts to provide this information in its next annual submission. The plans for improvements include investigations into the production of land use cartography, on the forest inventory and on the soil sequestration factors, to fully address the questions identified and to achieve a higher methodological level. The ERT recommends that, in its next annual submission, Portugal conduct the estimations of carbon stock changes for these unaccounted pools or provide verifiable information that these pools are not sources of GHG emissions, bearing in mind that for key categories the IPCC good practice guidance for LULUCF requires a tier 2 method to be applied to estimate emission and removals for these carbon pools.

100. The ERT noted that the NIR does not include information about the treatment of factoring out in the KP-LULUCF inventory, which is a requirement of paragraph 7 of the annex to decision 15/CMP.1. During the review, Portugal explained that it will not use factoring out, because the observed impacts of climate change are causing a net loss in the productive capacity of the forests, mainly because of droughts and natural fires. The ERT recommends that Portugal include this information in its next NIR.

101. The AD reported by Portugal under the Convention for biomass burning from wildfires on forest land remaining forest land is 5,500 ha for 2008. The ERT noted that this is not consistent with the area for biomass burning provided under the KP-LULUCF reporting. In response to questions raised by the ERT during the review, Portugal explained that the area provided under the Convention reporting is correct. The ERT recommends that Portugal reassess the information provided in the KP-LULUCF CRF tables in its next annual submission.

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

102. In the NIR, Portugal states that all its forests are managed and therefore all the occurring changes in the period are human induced. Nevertheless, the NIR does not mention that activities under Article 3, paragraph 3, of the Kyoto Protocol began after 1 January 1990 and before 31 December 2012. In response to questions raised during the review, Portugal explained that a new version of the National Forestry Inventory is being

developed in 2010, which includes the collection of information to demonstrate that these activities have begun since 1990. The ERT recommends that Portugal provide the information according to paragraph 8(a) of the annex to decision 15/CMP.1 in its next annual submission.

Afforestation and reforestation – CO_2

103. In its NIR, Portugal does not provide information on harvested forests during the first commitment period that has been afforested since 1990, although AD are provided in CRF table 5(KP-I)A.1.2. The ERT recommends that Portugal provide this information in its next annual submission, according to paragraph 8(c) of the annex to decision 15/CMP.1.

Deforestation – CO_2

104. In its NIR, Portugal states that the information on areas and GHG emissions from deforestation activities has high uncertainties values and efforts are being made to improve data on annual rates of deforestation. The ERT encourages Portugal to continue its efforts to improve the information on deforestation in its next annual submission.

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

Forest management – CO_2

105. In the NIR, Portugal states that all forest land is managed and that management activities are human induced. However, the NIR does not provide sufficient information to justify this statement, nor does it provide sufficient information regarding the requirement to demonstrate that these activities occurred since 1 January 1990. Portugal has stated that the development of a new National Forest Inventory is ongoing, which includes the collection of information to demonstrate that these activities have begun since 1990. The ERT recommends that Portugal provide this information in accordance with paragraph 9(a) of the annex to decision 15/CMP.1 in its next annual submission.

Cropland management – CO_2

106. In the NIR, Portugal does not provide information to demonstrate that GHG emissions and removals resulting from cropland management are not accounted for under activities under Article 3, paragraph 3, of the Kyoto Protocol. During the review, Portugal stated that methodological developments are taking place in order to collect updated information on cropland management activities. The ERT recommends that Portugal provide this information according to paragraph 9(c) of the annex to decision 15/CMP.1 in its next annual submission.

Grazing land management – CO_2

107. In the NIR, Portugal does not provide information to demonstrate that GHG emission and removals resulting from grazing management are not accounted for under activities under Article 3, paragraph 3, of the Kyoto Protocol. During the review, Portugal stated that new information is being collected on grazing land management activities in order to fulfil the corresponding KP-LULUCF CRF tables. The ERT encourages Portugal to provide this information according to paragraph 9(c) of the annex at decision 15/CMP.1 in the next annual submission.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

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

109. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88(a–j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1.

110. Information reported by Portugal on records of any discrepancies and on any records of non-replacement was found to be consistent with information provided to the secretariat by the ITL.

National registry

111. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place. However, the SIAR identified that the national registry has not fulfilled all the requirements regarding the public availability of information in accordance with paragraph 45(d) of the annex to decision 13/CMP.1, because Portugal did not include the Party identifier (two-letter country code defined by ISO 3166) to the representative identifier information. The ERT recommends that Portugal address this problem and that it report the results in its next annual submission.

Calculation of the commitment period reserve

112. Portugal has reported its commitment period reserve in its 2010 annual submission. Portugal 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.

3. Changes to the national system

113. Portugal provided information on changes to its national system since the previous annual submission concerning the arrangements put in place to deal with the additional reporting requirements in accordance with Article 3, paragraphs 3 and 4, of the Kyoto Protocol. An inter-institutional working group was created in order to work on the

[5] The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

definition of the methodology to identify the land areas and account for the emissions and removals. During the review, Portugal provided the ERT with additional information regarding the work of this group, such as who coordinates the group, the frequency of the meetings, the funding of planned activities and the different planned products and relevant entities involved. The ERT recommends that the Party include this information in its next NIR. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

114. Portugal reported that there are no changes in its national registry since the previous annual submission except one major update of the registry software, which makes use of a new generic web service. Portugal reported detailed test results. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

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

116. However, the ERT noted that the reported information was not sufficiently transparent and complete and the following information was not provided in the NIR: complete information on the approaches taken to minimize adverse social, environmental and economic impacts on developing country Parties and examples of concrete actions taken; and information on the prioritization of actions in implementing its commitments under Article 3, paragraph 14, of the Kyoto Protocol. During the review Portugal provided the ERT with the missing information.

117. Portugal reported that, in the framework of the Kyoto Protocol, its commitment to support developing countries has been implemented and different actions have been developed and a range of instruments conceived to promote sustainable development. Portugal reported on its transition to a low carbon economy, which relies on the contribution of all sectors. In particular, the Portuguese Energy Strategy relies, to a great extent, on the diversification of energy sources and the increase of endogenous resources. However, at present, Portugal remains highly dependent on the import of fossil fuels. Moreover, Portugal reported on its cooperation with developing countries, with regard to assessing vulnerabilities and risks associated with climate change and supporting the implementation of adaptation measures in the most vulnerable countries and institutional capacity-building activities. The ERT recommends that Portugal include this information and information on the prioritization of actions in implementing its commitments under Article 3, paragraph 14, of the Kyoto Protocol, in its next annual submission.

III. Conclusions and recommendations

118. Portugal made its annual submission on 15 April 2010. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto

Protocol units, changes to the national system and the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This is in line with decision 15/CMP.1.

119. 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 the Party has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are complete in terms of geographical coverage (except KP-LULUCF emission and removal estimates which do not include the Azores and Madeira territories), years and sectors, as well as complete in terms of categories and gases. Some of the categories, particularly in the energy sector (N_2O fugitive emissions from flaring), the agriculture sector (CH_4 from soils) and the LULUCF sector (CO_2 from grassland remaining grassland and CO_2 from lime application), were reported as not estimated. The ERT recommends that the Party provide estimates for these categories in its next annual 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.

120. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported generally in accordance with decision 15/CMP.1, except for the information on activities under Article 3, paragraphs 3 and 4, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which need to be further improved.

121. The Party's inventory is in line with the UNFCCC reporting guidelines, and generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT identified some deviations from the IPCC good practice guidance and the IPCC good practice guidance for LULUCF which Portugal should address in its next annual submission, such as: significant inconsistencies in the representation of land use; the use of tier 1 methods for some key categories; and the use of linear forecast to estimate AD in the industrial processes sector.

122. The ERT concluded that Portugal's submission on KP-LULUCF activities is generally in accordance with the requirements of paragraphs 5–9 of the annex to decision 15/CMP.1. However, the ERT found that the Party reported most of the KP-LULUCF CRF tables for its base year (1990) with the notation keys as "NE" and "NO" only. Moreover, verifiable information which demonstrates that any unaccounted pool is not a net source of anthropogenic GHG emissions has not been provided by Portugal.

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

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

125. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. However, the ERT identified that the registry has not fulfilled all the requirements regarding the public availability of information in accordance with paragraph 45(d) of the annex to decision 13/CMP.1, because Portugal did not include the Party identifier (two-letter country code defined by ISO 3166) to the representative identifier information.

126. Portugal has reported the information requested in chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3,

paragraph 14" as part of its 2010 annual submission. The information was provided on 15 April 2010. The information reported is not sufficiently transparent and complete. During the review, the Party provided additional information.

127. In the course of the review, the ERT formulated a number of recommendations relating to the transparency and completeness of the annual submission (including Article 7.1 information) and the accuracy of the estimates. The key recommendations are that Portugal:

(a) Improve the transparency of the energy sector in the NIR, including a separate section for international bunker emissions;

(b) Include in the NIR a description of category-specific QA/QC and verification activities for all categories;

(c) Develop national statistics AD for glass production, iron and steel and ferroalloys production;

(d) Develop country-specific values for CO_2 emissions from cement production, feed digestibility for CH_4 emissions from the enteric fermentation of dairy cows, parameters of the FOD model to estimate CH_4 from landfills, N_2O EFs and data on protein intake to estimate N_2O emissions from wastewater treatment;

(e) Consider all mandatory information items on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol for complete KP-LULUCF reporting;

(f) Include the information on approaches taken to minimize adverse social, environmental and economic impacts on developing country Parties, examples of concrete actions taken and information on prioritization of actions in implementing its commitments under Article 3, paragraph 14.

IV. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

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

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

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

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

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

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

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

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

Status report for Portugal 2010. Available at <http://unfccc.int/resource/docs/2008/asr/prt.pdf>.

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

FCCC/ARR/2009/PRT. Report of the individual review of the greenhouse gas inventory of Portugal submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/arr/prt.pdf>.

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

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Teresa Pereira (Agencia Portuguesa do Ambiente, APA), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Portugal:

Agencia portuguesa do ambiente.2010. *Soil organic carbon stocks in Portuguese soils.* Lisbon:APA (100128 rt Methodology soil carbon_V01.pdf)

Ministerio da agricultura do desenvolvimento rural e das pescas, autoritade florestal nacional defesa de floresta. 2009. *Areas ardidas e ocorrencias em 2008* (*Forest fires in 2008*). Lisboa:MADRP (2009D-AFN-CTGIR-Relatorio-2008.pdf)

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
CaO	lime
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
FOD	first order decay
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP_LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable
NE	not estimated
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change