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## **Report on the individual review of the annual submission of Portugal submitted in 2015\***

**Note by the expert review team**

### *Summary*

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information required under Article 7, paragraph 1 of the Kyoto Protocol, with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2015 annual submission of Portugal, conducted by an expert review team in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol”. The review took place from 12 to 17 September 2016 in Bonn, Germany.


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\* In the symbol for this document, 2015 refers to the year in which the inventory was submitted, not to the year of publication.

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## I. Introduction<sup>1</sup>

1. This report covers the review of the 2015 annual submission of Portugal organized by the UNFCCC secretariat, in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1, as revised by decision 4/CMP.11) (hereinafter referred to as the Article 8 review guidelines). As indicated in the Article 8 review guidelines, this review process also encompasses the review under the Convention, as described in the “Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention” (hereinafter referred to as the UNFCCC review guidelines) and particularly part III, “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. The review took place from 12 to 17 September 2016 in Bonn, Germany, and was coordinated by Ms. Claudia do Valle and Mr. Roman Payo (UNFCCC secretariat). Table 1 provides information on the composition of the expert review team (ERT) that conducted the review of Portugal.

Table 1

### Composition of the expert review team that conducted the review of Portugal

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Mr. Newton Paciornik	Brazil
	Ms. Daniela Romano	Italy
Energy	Mr. Alexey Cherednichenko	Kazakhstan
	Mr. Hiroshi Ito	Japan
	Mr. Ole-Kenneth Nielsen	Denmark
	Mr. Shengmin Yu	China
IPPU	Ms. Niculina Mihaela Balanescu	Romania
	Mr. Julien Jabot	Norway
	Ms. Eva Krtkova	Czechia
Agriculture	Mr. Paul Duffy	Ireland
	Mr. Tomas Paulaitis	Lithuania
	Mr. Bráulio Pikman	Brazil
LULUCF	Ms. Tracy Johns	United States of America
	Mr. Mattias Lundblad	Sweden
	Ms. Marina Shvangiradze	Georgia
Waste	Ms. Sumaia Elsayed	Sudan

<sup>1</sup> At the time of publication of this report, Portugal had not yet submitted its instrument of ratification of the Doha Amendment, and the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
	Ms. Katja Pazdernik	Austria
Lead reviewers	Mr. Ole-Kenneth Nielsen	
	Mr. Newton Paciornik	

*Abbreviations:* IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry.

2. This report contains findings based on the assessment by the ERT of the 2015 annual submission against the Article 8 review guidelines. The ERT has made recommendations to resolve those findings related to issues,<sup>2</sup> including issues related to problems.<sup>3</sup> Other findings, and, if applicable, the ERT’s encouragements to resolve them, are also included.

3. 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.

4. Annex I shows annual greenhouse gas emissions for Portugal, including totals excluding and including the land use, land-use change and forestry sector, indirect carbon dioxide emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and additional activities under Article 3, paragraph 4, of the Kyoto Protocol, if elected, by gas, sector and activity for Portugal.

5. Information to be included in the compilation and accounting database can be found in annex II.

6. The ERT notes that Portugal’s 2015 annual submission was delayed, consistent with decision 6/CMP.9, paragraph 4. As a result, the review of the 2015 annual submission is being held in conjunction with the review of the 2016 annual submission, in accordance with decision 10/CMP.11, paragraph 1. To the extent that identical information is presented in both annual submissions, the ERT has reviewed this information only once, and, as appropriate, has replicated the findings below in both the 2015 and 2016 annual review reports.

## **II. Summary and general assessment of the 2015 annual submission**

7. Table 2 provides the ERT assessment of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5 below.

<sup>2</sup> Issues are defined in decision 13/CP.20, annex, paragraph 81.

<sup>3</sup> Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

Table 2  
**Summary of review results and general assessment of the inventory of Portugal**

<i>Assessment</i>		<i>Issue or problem ID #(s) in tables 3 and/or 5<sup>a</sup></i>	
Dates of submission	Original submission: 27 May 2016 (NIR), 27 May 2016, version 2 (CRF tables), 15 April 2016 (SEF tables)  Revised submission: 3 November 2016, version 3 (CRF tables), 22 December 2016, version 5 (CRF tables), 27 May 2016 (SEF tables)  The values from the latest submission are used in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	1. Identification of key categories	Yes	G.5, G.10
	2. Selection and use of methodologies and assumptions	Yes	E.9, E.45, I.13, I.16, I.17, I.24, A.13
	3. Development and selection of emission factors	Yes	E.16, E.26, E.29, E.33, E.34, E.41, E.42, W.5, W.6
	4. Collection and selection of activity data	Yes	I.33, A.8, L.6, L.12, L.15, KL.1, KL.2
	5. Reporting of recalculations	No	
	6. Reporting of a consistent time series	Yes	I.4, I.22
	7. Reporting of uncertainties, including methodologies	Yes	G.3, G.12
	8. QA/QC		QA/QC procedures were assessed in the context of the national system (see below)
	9. Missing categories/completeness <sup>b</sup>	Yes	E.44, I.11, I.14, I.35, A.12
	10. Application of corrections to the inventory	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	The Party did not report "NE" for any insignificant categories	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary	Have any issues been identified in the following areas:		

<i>Assessment</i>			<i>Issue or problem ID #(s) in tables 3 and/or 5<sup>a</sup></i>	
information under the Kyoto Protocol	1.	National system:		
		(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	No	
		(b) Performance of the national system functions	No	
	2.	National registry:		
		(a) Overall functioning of the national registry	No	
		(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	3.	ERUs, CERs, AAUs and RMUs and on information on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, taking into consideration any findings or recommendations contained in the SIAR	No	
	4.	Matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, including any changes since the previous annual submission	Yes	G.7
	5.	LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol:		
		(a) Reporting in accordance with the requirements of decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.11
		(b) The Party has demonstrated methodological consistency between the reference level and reporting on forest management in accordance with decision 2/CMP.7, annex, paragraph 14	Yes	KL.11
		(c) The Party has reported information in accordance with decision 6/CMP.9	Yes	KL.8
		(d) The Party plans to apply the provisions for natural disturbances to afforestation and reforestation	No	
		(e) The Party plans to apply the provisions for natural disturbances to forest management	No	
	(f) Country-specific information has been reported to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	No		
	(g) Other issues	No		

Assessment		Issue or problem ID #(s) in tables 3 and/or 5 <sup>a</sup>	
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No	
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next <sup>c</sup> review be conducted as an in-country review?	Yes	Please refer to annex III for a list of questions and issues to be considered during this in-country review
Question of implementation	Did the ERT list a question of implementation?	No	

*Abbreviations:* AAU = assigned amount unit, CER = certified emission reduction unit, CPR = commitment period reserve, CRF = common reporting format, ERT = expert review team, ERU = emission reduction unit, LULUCF = land use, land-use change and forestry, NA = not applicable, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control, RMU = removal unit, SEF = standard electronic format, SIAR = standard independent assessment report, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, Wetlands Supplement = 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands.

<sup>a</sup> The ERT identified additional issues in all sectors that are not specifically listed in table 2 but are included in table 3 and/or 5.

<sup>b</sup> Missing categories, for which methods are provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, may affect completeness and are listed in annex III to this document.

<sup>c</sup> Owing to the timing of the review of the 2015 annual submission, “next” in this context refers to the review of the 2017 annual submission.

### III. Status of implementation of issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in the previous review report published on 7 May 2015. For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2015 annual submission and provided the rationale for its determination, taking into consideration the publication date of the previous review report and national circumstances.

Table 3  
**Status of implementation of issues and/or problems raised in the previous review report of Portugal**

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	QA/QC and verification (table 3, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement additional QC procedures to avoid errors and discrepancies between the CRF tables and the NIR	Resolved  The ERT noted that most of the inconsistencies identified in the 2014 ARR have been resolved or are no longer relevant (see E.6, E.12, E.13, A.1, A.3 and A.5 below). Only one previous recommendation is still to be resolved and is being evaluated in L.11 below
G.2	QA/QC and verification (12, 2014) Transparency*	Provide information on the QC activities and the related results	Not resolved  The transparency of the information on the QC activities has not improved since the last submission. In response to a question raised by the ERT during the review, Portugal provided information on the QC activities related to the 2015 annual submission and informed the ERT that a specific QA/QC plan is still to be updated/further developed in order to define the priority objectives. Portugal also informed the ERT that the related information would be included in its next NIR
G.3	Uncertainty analysis (table 4, 2014) (table 4, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Revise and update the uncertainty data for the AD and EFs	Addressing  Portugal has revised and updated most of the uncertainty data for the categories referred to in the 2014 ARR (see A.2 and L.4 below). However, It is still missing a revision and update for F-gases. In response to a question raised by the ERT during the review, Portugal informed the ERT that the F-gases sector is under a thorough review, based on a national enquire made under the EU regulation 517/2014 and because relevant changes in uncertainty values are expected, the Party resolved to revise and



<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
			update the uncertainty analysis for F-gases in its next submission
G.4	Uncertainty analysis (17, 2014) Transparency	Improve the reporting of the results of the uncertainty analysis by providing in the NIR the level of uncertainty for the last reported year and showing the results of the analysis in the table in the annex	Resolved  Portugal has implemented the recommendation. However, other errors remain or were introduced in the 2015 Party's reporting (see G.12 in table 5)
G.5	Key category analysis (16, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Identify key categories in accordance with the IPCC good practice guidance for LULUCF, given that the Party failed to identify some non-LULUCF key categories	Not resolved  Although the guidance on how to assess key categories (KCs) in the 2006 IPCC Guidelines has changed, the UNFCCC Annex I inventory reporting guidelines establish that the key category analysis (KCA) has to be performed with and without LULUCF. Therefore, those categories that appear to be 'key' when the LULUCF sector is excluded from the KCA, should be considered as key categories, even though they do not appear to be key when the KCA is performed with LULUCF
G.6	Inventory management (18, 2014) (11, 2013) Transparency*	Improve the archiving system by providing further description of the record-keeping and archiving procedures	Not resolved  No further description was included in the NIR in sections 1.2 and 1.3
G.7	Article 3, paragraph 14, of the Kyoto Protocol (134, 2014) Transparency*	Report any change(s) in the information provided under Article 3, paragraph 14, of the Kyoto Protocol in accordance with decision 15/CMP.1, annex, chapter I.H, and/or further relevant decisions of the CMP, considering that the ERT found differences in the reporting between the 2013 and 2014 submissions	Not resolved  Portugal has improved its reported information, including other activities related to Article 3, paragraph 14, of the Kyoto Protocol not previously described. However, Portugal continues to report the full activities undertaken, not identifying the changes since the previous report, as required by decision 15/CMP.1
Energy			
E.1	Fuel combustion – reference approach –	Improve the consistency between the energy balance and the data available for large point	Not resolved

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	all fuels – CO <sub>2</sub> (25, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	sources for reducing differences between reference and sectoral approach	The Party informed the ERT that it is still making efforts to improve consistency between the data for large point sources and the energy balance
E.2	Fuel combustion – reference approach – all fuels – CO <sub>2</sub> (25, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the consistency between the split between domestic and international energy consumption for aviation and navigation for reducing differences between reference and sectoral approach	Addressing  The Party explained that the criterion used by the General Directorate for Energy and Geology for the allocation of fuel consumption for international aviation and international navigation is the criterion of the flag of the aircraft/vessel rather than in the origin and destination of the movement; and that is the reason for the differences between the reference and sectoral approaches. For aviation some improvements have been made and since 2007, the criterion adopted by General Directorate for Energy and Geology has been the destination country. However, for the period prior to 2007, as most of the Portugal's flights were carried out by a national airline, most fuel consumption was considered as national aviation regardless of the flight destination, and which is why the reported fuel consumption is low for international bunkers reported using the reference approach
E.3	Fuel combustion – reference approach – all fuels – CO <sub>2</sub> (26, 2014) Transparency	Provide complete information related to the appropriate conversion factors	Resolved  Owing to changes in the reporting format for the CRF tables, all AD are now provided in TJ for the reference approach and for the sectoral approach. Portugal included the energy balance (in toe) in annex E to the NIR, and included the NCV values used for converting the original units to TJ (i.e. MJ/kg and MJ/Nm <sup>3</sup> for natural gas) in the reference chapter (i.e. tables 3.7, 3.8, 3.9

ID#	Issue and/or problem classification <sup>a,b</sup>	Recommendation made in previous review report	ERT assessment and rationale
E.4	International aviation liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (27, 2014) Transparency	Improve the estimation of international aviation bunkers and resolve the discrepancy between the energy balance and the IEA data for international aviation energy consumption	Resolved  The discrepancy in the international aviation energy consumption data between the energy balance and the IEA data no longer exists for 2007 onwards. Until 2006, the discrepancy between the energy balance and the IEA data results from the treatment of data by IEA after receiving the information from the General Directorate for Energy and Geology, that incorrectly include consumption of domestic aviation. The Party explained that the discrepancy on data prior 2006 will be resolved in the next submission
E.5	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO <sub>2</sub> (28, 2014) (22, 2013) Transparency*	Implement the planned revision and further development of the reporting of feedstocks and non-energy use of fuels and explain transparently the estimates and the notation keys reported in CRF table 1.A(d)	Not resolved  Portugal still reports the notation key “NO” in CRF table 1.A(d) for CO <sub>2</sub> emissions from a number of fuels used for non-energy purposes rather than reporting the associated emissions and information on where they are reported (see also E.22, table 5)
E.6	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO <sub>2</sub> (29, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Correct the inconsistency of the reported data for LPG consumption in CRF tables 1.A(b) and 1.A(d) and in the NIR	No longer relevant  The recommendation is no longer relevant owing to the implementation of the revised UNFCCC Annex I inventory reporting guidelines (decision 24/CP.19)
E.7	Feedstocks, reductants and other non-energy use of fuels – other fuels – CO <sub>2</sub> (30, 2014) Transparency	Specify the fuel for “other non-specified” in non-energy use of fuels in CRF table 1.A(d) to improve transparency	Resolved  The methods used by the Party were revised in accordance with the 2006 IPCC Guidelines and in the current submission the Party reported as “NO” for the entire time-series

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
E.8	Feedstocks, reductants and other non-energy use of fuels – gas – CO <sub>2</sub> (31, 2014) Transparency*	Explain the method used to estimate CO <sub>2</sub> emissions resulting from the use of natural gas for hydrogen production in one refinery	Not resolved  Portugal has not provided information on hydrogen production or on the method used to estimate CO <sub>2</sub> emissions in the NIR. Portugal informed the previous ERT that hydrogen production in refineries was reported as fugitive emissions from refining/storage of oil and that further details could not be provided due to confidentiality reasons; and that EFs lie between 2.77 and 2.80 t CO <sub>2</sub> /t natural gas. However, this information was not included in the NIR
E.9	1.A.1.a Public electricity and heat production – biomass – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (34, 2014) Accuracy*	Analyse and consider in the emission estimates the humidity content of the incinerated waste to ensure that the corresponding emissions are not overestimated	Not resolved  The Party reported in the NIR (table 10.1) that this issue will be reviewed in the future
E.10	1.A. Fuel combustion – sectoral approach other fuels – CO <sub>2</sub> (35, 2014) Transparency*	Move the methodological description for CO <sub>2</sub> emissions from limestone used for desulphurization in the NIR from the energy sector to the industrial processes sector	Not resolved  The methodological description is still included in the energy chapter of the NIR, while the emissions are reported under the IPPU chapter
E.11	1.A.1.b Petroleum refining – gaseous and liquid fuels – CO <sub>2</sub> (36, 2014) Transparency*	Include in the NIR the information provided during the review on the estimation of plant-specific CO <sub>2</sub> EFs and AD for liquid and gaseous fuels combusted for energy purposes in the category petroleum refining	Not resolved  Portugal has not provided the required information in section 3.3.1.2 of the NIR. The Party explained in the NIR (table 10.1) that the recommendation is under implementation. During the previous review, Portugal informed the ERT that the plant-specific CO <sub>2</sub> EFs and AD cannot be published because of confidentiality reasons and that their use in the emission estimates is fully consistent with EU ETS data for the period 2005–2012. In addition, Portugal confirmed that double counting does not occur, as all non-combustion emissions

ID#	Issue and/or problem classification <sup>a,b</sup>	Recommendation made in previous review report	ERT assessment and rationale
			from refineries are reported under the category fugitive emissions
E.12	1.A.2.a Iron and steel – liquid and solid fuels – all gases (38, 2014) (30, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Ensure the consistency of the reported data for the consumption of oil waste and tar under iron and steel production in the CRF tables and in the NIR	Resolved Portugal has corrected the reporting of the AD values for oil waste and tar in the 2015 NIR and ensured consistency with the CRF tables. In the 2014 NIR, Portugal reported the same value for these fuels for the period 2000–2010. In the NIR, the values are reported as “zero” for this period, as no consumption of fuels from this category has occurred in Portugal since 2001
E.13	1.A. Fuel combustion – sectoral approach liquid fuels – CO <sub>2</sub> (39, 2014) (31, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Report consistent information on the CO <sub>2</sub> EF for gasoline in the NIR and in the CRF tables under manufacturing industries and construction and road transportation, and revise the related QA/QC procedures	Resolved Portugal reported in the NIR and in the CRF tables consistent information on the CO <sub>2</sub> EF for gasoline. The CO <sub>2</sub> EFs are in accordance with the 2006 IPCC Guidelines (69.3 t/TJ for static engines and 68.6 t/TJ for boilers under manufacturing industries and construction), and for road transportation, the Party used the EF as calculated by the COPERT IV model, for which the car/passenger input is 68.6 t/TJ
E.14	1.A.1.c Manufacture of solid fuels and other energy industries – gaseous and liquid fuels – all gases (41, 2014) Transparency*	Improve the explanations on how the emissions of fuel gas, LPG, fuel oil, naphtha and natural gas used as feedstock in the production of city gas are estimated and allocated	Not resolved Portugal has not included the information on the allocation of GHG emissions from fuel used as feedstock in the production of city gas in the NIR. In addition, the ERT noted that the 2016 NIR, there is no section related to the manufacture of solid fuels and other energy industries (category 1.A.1.c), including category 1.A.1.c.iii (other energy industries – that is city gas for Portugal according to the 2014 NIR). See E.31 in table 5
E.15	1.A.2 Manufacturing industries and	Explain and justify in the NIR the circumstances which led to the inclusion of the	Not resolved Portugal has not included in the

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	construction – gaseous, liquid and solid fuels – all gases (42, 2014) Transparency*	emissions from fuel consumption in coal mining in category 1.A.2 (manufacturing industries and construction) under extractive industry instead of under category 1.A.1.c (manufacture of solid fuels and other energy industries)	2015 NIR the required information explaining that coal production in Portugal occurred only from 1990 to 1994 (as shown in table 3.60, p.3-81 of the 2014 NIR) and that it was not possible to separate the fuel consumption of the activities related to the extraction of materials. In addition, in the NIR, the Party changed the method of reporting and in table 3.57 (p.3-61), information on the consumption of fuel in extractive industry was not provided for the period 1991–1994, as in the previous submission
E.16	1.A.3.b Road transportation – liquid fuels – CO <sub>2</sub> (44, 2014) (76, 2012) Accuracy*	Continue with the efforts to develop country-specific CO <sub>2</sub> EFs for gasoline and diesel oil, and investigate the possibility of obtaining a country-specific CO <sub>2</sub> EF for the gasoline and diesel oil reported under the EU ETS	Not resolved  Portugal has not developed country-specific EFs. The Party explained in the NIR (table 10.1) that the CO <sub>2</sub> EFs for gasoline and diesel oil reported under the EU ETS are based on inventory default EFs and do not refer to country-specific EFs. Portugal informed the ERT that despite the efforts made and several discussions with the Portuguese Energy Authority and the oil companies, no results have been obtained thus far
E.17	1.A.3.c Railways – liquid fuels – CO <sub>2</sub> (45, 2014) Transparency	Provide an explanation of the recalculation made in response to a recommendation of the 2012 review report, related to the implementation of the same CO <sub>2</sub> EF for the same type of diesel oil across all categories under which it is consumed	Resolved  The CO <sub>2</sub> EF was revised for this category in accordance with the 2006 IPCC Guidelines (see section 3.3.3 of the 2015 NIR)
E.18	1.A.3.c Railways – biomass – CO <sub>2</sub> (46, 2014) Transparency	Include in the NIR the information provided during the review to verify that the fuel reported under other fuels is biodiesel	Resolved  Biodiesel is now reported under biomass in the new CRF table 1.A(a)
E.19	1.B.2.a Oil – liquid fuels – CO <sub>2</sub> (47, 2014) Transparency*	Include in the NIR the information provided during the review on how Portugal ensures that some fugitive CO <sub>2</sub> emissions from oil refineries are not double counted or omitted	Not resolved  Portugal has not included the required information in the 2016 NIR. According to the previous

ID#	Issue and/or problem classification <sup>a,b</sup>	Recommendation made in previous review report	ERT assessment and rationale
E.20	1.B.2.a Oil – liquid fuels – CO <sub>2</sub> (48, 2014) Transparency	Explain the differences in the AD and CO <sub>2</sub> IEF for refining/storage (category 1.B.2.a.4) and the distribution of oil products (category 1.B.2.a.5) between the 2013 and 2014 submissions, considering that the Party informed the ERT that no recalculations were performed	<p>review report the Party explained that for the estimation of fugitive emissions from oil refining and storage activities (category 1.B.2.a.4) the Party uses data directly from the EU ETS. This approach allows Portugal to control the separation of combusted fuels from the quantities of fuels used in activities such as flaring, fluid catalytic cracking, catalyst regeneration, platforming and hydrogen production. The CO<sub>2</sub> EFs are obtained directly from a fuel analysis</p> <p>Resolved</p> <p>Portugal explained during the last review that there were no recalculations. The differences observed were due to the use of incorrect units in AD (in the 2013 submission the upload in the CRF Reporter for the AD were in kt and not Mt); and because Portugal corrected the allocation of AD and emissions (moved from oil exploration to oil transport) in the 2014 submission</p>
E.21	1.A.3.e.ii Other (other transportation) – gaseous, liquid and solid fuels – all gases (49, 2014) Comparability*	<p>Explain in the NIR and in CRF table 1.A(a) where the emissions from the combustion of fuels used for supporting pipeline transportation activities and for ground activities in airports are allocated</p> <p>Report the AD and emissions from ground activities in airports in the category other transportation</p> <p>Explain what type of consumption is included in the item “Serviços” from the energy balance and report the fuel consumption and the associated emission estimates under the appropriate category</p>	<p>Not resolved</p> <p>Portugal has not included the required information in the 2016 NIR. Portugal explained during the last review that fuel consumption for ground activities in airports (category 1.A.3.e) and electricity consumption for pipeline transportation activities (category 1.A.3.e.i) are reported under the category commercial/institutional (category 1.A.4.a), because the energy balance allocates those activities under the item “Serviços”</p>
IPPU			
I.1	2. General (IPPU) – general	Improve the transparency of the information on how the consistency of the time series is	Addressing

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(53, 2014) Transparency	ensured for subcategories for which EU ETS data are used for only some years in the period 1990–2012	The issues raised in this recommendation have been evaluated by the current ERT under the related categories (see I.3 and I.4 below).
I.2	2. General (IPPU) – general (54, 2014) (39, 2013) Transparency*	Include information in the NIR on specific QA/QC activities for industrial processes, for example for limestone and dolomite use and for glass production (reported under other mineral products) for which this information is not currently included	Not resolved  Portugal has not included information in the NIR on the sector-specific QA/QC activities. The Party informed the ERT during the review that it will address this issue in future submissions
I.3	2.A.1 Cement production – CO <sub>2</sub> (55, 2014) Accuracy	Clarify the methodological description related to the fluctuation of the IEF for the years 2005–2012	Resolved  Portugal included the required information in the NIR (section 4.3.1.3). The fluctuation in the IEF from 2005 onwards is due to changes in the recirculation rate (i.e. changes in the amount of alternative fuels (partially composed of biomass))
I.4	2.A.2 Lime production – CO <sub>2</sub> (57, 2014) (41, 2013) Consistency*	Ensure the consistency of the entire time series in order to avoid differences in the IEF between the periods 1990–2004 (and 2005) and 2006 onwards	Not resolved  The Party informed the ERT during the review that this issue will be addressed in future submissions. (see also I.12 in table 5)
I.5	2.A.4 Other process uses of carbonates – CO <sub>2</sub> (58, 2014) Accuracy	Complete the AD on limestone and dolomite use to improve time-series consistency and avoid the differences in the IEF between the periods 1990–2007 and 2008 onwards	No longer relevant  The changes to the methodologies provided in the 2006 IPCC Guidelines have significantly affected the reporting of uses of carbonates. The Party reallocated emissions from the use of carbonates (now reported under categories 2.A.3, 2.A.4 and 2.C.1 for use in wastewater treatment and in the agriculture sector). For this reason, the recommendation is no longer relevant and the new findings are contained in table 5 (see I.22 and I.23)
I.6	2.F. Product uses as substitutes for ozone-	Enhance the transparency of the reporting by providing information on the outcomes of the	No longer relevant  The methodology provided in the



<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	depleting substances – HFCs and SF <sub>6</sub> (59, 2014) Transparency	comparison of the results from the two models that are used to estimate the potential and actual emissions of HFCs and SF <sub>6</sub>	2006 IPCC Guidelines changed and the comparison of the models is therefore no longer relevant. (see also I.37 in table 5)
I.7	2.F.3 Fire protection – HFCs (60, 2014) Transparency	Provide in the NIR more detailed information on the methodology and other parameters used to estimate HFC emissions from fire extinguishers	No longer relevant  The methodology provided in the 2006 IPCC Guidelines changed and the requested information is no longer necessary. The ERT evaluated this category under the new methodology requirements (see I.37 in table 5)
I.8	2.B.7 Soda ash production – CO <sub>2</sub> (61, 2014) Accuracy	Correct the inconsistency of figure 4-18 in the NIR (the figure should not include soda ash); report the AD for soda ash use in kt in CRF table 2(I).A-G; and review the AD and emission estimates reported for soda ash to ensure that no double counting occurs	Resolved  Portugal revised the information on this category and the ERT noted that there is no double counting with other sectors. The AD are reported in kt in CRF table 2(I).A-H. The Party explained that the figure will be corrected in the next submission. The ERT considered the correction of the figure important but also considered that it was not of significant relevance, and therefore assessed this issue as “resolved”
I.9	2.B Chemical industry CO <sub>2</sub> and CH <sub>4</sub> (62, 2014) Transparency	Explain the changes in the methodology used to estimate CO <sub>2</sub> and CH <sub>4</sub> emissions from ethylene. Include in the explanation the data sources used and changes in the emission estimates	Resolved  Portugal provided new emission estimates in section 4.4.9 of the NIR. However, due to the new requirement of applying the 2006 IPCC Guidelines the ERT raised another issue in relation to this category (see I.27 in table 5)

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#### Agriculture

A.1	3. General (agriculture) – (66, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Correct the editorial issues in the NIR and continue improving the transparency and the QC procedures of the reporting to reduce the number of inconsistencies and errors within the NIR and between the CRF tables and the NIR	Resolved  All the requested corrections were resolved by the Party but new editorial issues were identified by the ERT and are described in A.7 (see table 5)
A.2	3. General (agriculture) –	Develop and include country-specific uncertainty values for the AD and EFs, at a	Resolved  Portugal has determined the

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(67, 2014) (53, 2013) Accuracy	minimum for the key categories, and document them fully in the NIR	uncertainty for all the AD and EFs for the agriculture sector. The uncertainty determination was based on a combination of country-specific (mostly for the AD) and IPCC values (mostly for the EFs) and the ERT considers the level of analysis appropriate. The EFs and EF uncertainty for manure management and managed soils are based on country-specific data. Portugal is still working to improve the EFs and EF uncertainty for enteric fermentation but the ERT is of the view that the use of IPCC default values is acceptable
A.3	3.B Manure management – CH <sub>4</sub> (68, 2014) Transparency	Provide detailed information on the estimates for swine manure management in a table in the NIR, outlining the number of anaerobic digesters used to manage swine manure, the quantity of manure managed and the CH <sub>4</sub> recovered	Resolved Information on the emission estimates for swine manure management is provided in table 5.25 of the NIR (section 5.4.3) and in CRF table 3.B(a)s1
A.4	3.B Manure management – CH <sub>4</sub> (68, 2014) Transparency	Follow the methodological approach provided in the IPCC good practice guidance (table 4.10, footnote) to correctly reflect the practice of anaerobic digestion of swine manure, and document this approach in the NIR	Resolved Anaerobic digesters are described in the NIR (p.5-39) (three anaerobic digesters are used in the country). The total volume of manure and the reference to the recovered fraction are described in CRF table 3.B(a)
A.5	3.D.a Direct N <sub>2</sub> O emissions from managed soils – N <sub>2</sub> O (69, 2014) Accuracy	Implement QC measures which obviate the need to conduct recalculations of the consumption of mineral N fertilizers	Resolved Since the 2015 submission, Portugal has included synthetic fertilizer consumption (for all years of the time-series) based on information provided by the National Statistics Institute (table 5.42 of the NIR and CRF table 3.D). The IFA and FAO values were not available at the time of the preparation of the inventory, but this is not under the control of the Party and those values are used as a QC check
A.6	3.C Rice cultivation –	Enhance the QC procedures to ensure the	Resolved

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	CH <sub>4</sub> (70, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	accuracy of the CRF tables and the NIR, thereby avoiding any compilation errors and differences in the AD reported in the NIR and in the CRF tables	Portugal has made the required corrections and implemented the 2006 IPCC Guidelines in the 2015 submission (see section 5.5 of the NIR and CRF table 3.C)
<b>LULUCF</b>			
L.1	4. General (LULUCF) activity data (74, 2014) Transparency	Provide all methodological information in the NIR related to important variables such as MAI and wood volume that is required by the IPCC good practice guidance for LULUCF	Resolved  Portugal provided the country-specific definition of MAI and wood volume in the NIR (sections 6.1.3.2 and 6.1.3.3)
L.2	4. General (LULUCF) activity data (75, 2014) Transparency	In order to comply with the methodological requirements of the IPCC good practice guidance for LULUCF, continue to improve both the accuracy and the transparency of the AD, considering that Portugal extrapolated the trend observed until 2010 for 2011 and 2012, and continue to collect data on land-use change according to section 4.2.4.3.1 of the IPCC good practice guidance for LULUCF	Resolved  In the NIR (section 6.1.2), Portugal provided information on the representation of land areas and areas of land-use change (pp.6-2 to 6-19) and provided detailed explanations of the information sources used and the interpolation/extrapolation assumptions used
L.3	4. General (LULUCF) activity data (77, 2014) Transparency*	Provide information on the applicability of each data set that is not country-specific, and document all information and considerations that lead to the application of data from Spain for living biomass values for perennial crops	Not resolved  Portugal informed the ERT that the recommendation will be implemented in future submissions
L.4	4. General (LULUCF) activity data (78, 2014) Accuracy	Include in the NIR the information on the uncertainty analysis provided to the ERT during the review (i.e. that Portugal applied a tier 1 methodology and that the uncertainty estimates were calculated on the basis of the error propagation rules, which combine the uncertainty associated with the AD and the uncertainty associated with the EF or the other factors)	Resolved  A very detailed uncertainty analysis was provided in the 2015 NIR. The Party applied the uncertainty calculation method from the 2006 IPCC Guidelines. Along with the uncertainties assessed for the total LULUCF area, the Party individually assessed each of the possible 19x19 land-use changes. All the formulae and results of the calculations are provided in the NIR (section 6.14)
L.5	4.A.1 Forest land remaining forest land CO <sub>2</sub> (79, 2014)	Report the methodology used to define and estimate the MAI, considering that the NFIs from 1995 (NFI4) and 2005 (NFI5) were used to develop the average volume per hectare and	Resolved  In the 2015 NIR (section 6.1.3.2), Portugal clarified that the national

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	Transparency	the average MAI data in the 2014 submission	averages of MAI for each type of forest were obtained through expert consultations (e.g. field experts working on the forest inventory, in forest management and on forest policy)
L.6	4.A.1 Forest land remaining forest land CO <sub>2</sub> (80, 2014) Accuracy*	Complete the NFI6 to report updated estimates based on the new inventory information, for example for changes in forest areas caused by site fertility, the average volume per hectare and average MAI data	Not resolved  In response to a question raised by the ERT, Portugal clarified that for several reasons the production of the NFI6 has been delayed and it has not yet been published and therefore cannot be used for the GHG inventory. The Party confirmed that as soon as the Institute for Nature Conservation and Forestry (the agency in charge of the NFI6) releases the data, Portugal will update all variables that require that information source, including the FMRL, as necessary
L.7	4.A.1 Forest land remaining forest land CO <sub>2</sub> (87, 2014) Transparency	For “losses from living biomass” that now include “loss types” as well as the estimation of natural mortality, include in the NIR explanations of the methodology used	Resolved  In the 2015 NIR (section 6.2.1.2.2), Portugal included a detailed description of and revised estimates for “losses from living biomass” from forest land, comprising all possible “loss types”, as well as an estimation of natural mortality (other than the mortality caused by forest fires)
L.8	4.A.1 Forest land remaining forest land CO <sub>2</sub> (87, 2014) Transparency*	For “losses from living biomass” that now include “loss types” as well as the estimation of natural mortality, include an explanation of the expert judgments used for the methodology and validate the expert judgments and/or replace them with specific measurements	Not resolved  Portugal made some assumptions on the basis of the expert judgment used for the methodology (see L.7 above), but information on the details of the expert judgment and background information have not been included in the NIR
L.9	4.A.1 Forest land remaining forest land CO <sub>2</sub> (88, 2014) Transparency	For the loss type “other wood use”, include the explanation provided during the review on how the assumption of 25% was done	Resolved  Portugal provided the requested information in table 6.23 of the 2015 NIR. Additional clarification on salvaged wood, forest

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
			conversion and natural mortality were also provided
L.10	4.A.1 Forest land remaining forest land CO <sub>2</sub> (88, 2014) Transparency*	For the loss type “other wood use”, explain the respective expert judgment used for the assumption and validate the expert judgment and/or replace it with specific measurements	Not resolved Information explaining the expert judgment used for the assumption of 25% loss for “other wood use” (see L.9 above) was still not provided in the NIR
L.11	4.A.2 Land converted to forest land – CO <sub>2</sub> (90, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Address the inconsistency in the reporting of the value of harvesting under land converted to forest land in the NIR	Not resolved Portugal informed the ERT that 114 m <sup>3</sup> /ha was used in the emissions calculations and that the value of 110 m <sup>3</sup> /ha was reported incorrectly in the NIR; The Party also informed the ERT that this inconsistency will be addressed in the next NIR
L.12	4.A.2 Land converted to forest land – CO <sub>2</sub> (95, 2014) Accuracy*	Develop further the sampling and estimation system and the application of the sampling system in developing carbon stock change estimates	Addressing Portugal informed the ERT that a sampling system is being developed, but it has not yet been implemented
L.13	4.B.1 Cropland remaining cropland – CO <sub>2</sub> (96, 2014) Transparency*	Include in the NIR the information provided during the review (i.e. that non-tillage of cropland was all the result of the application of economic incentives from agri-environmental measures that started, for no tillage, in 2004). Before that time, the use of no tillage outside experimental plots and farms was marginal	Not resolved Portugal informed the ERT that a reference to the source of the AD (agri-environmental data) was included in section 6.3.1.5 of the NIR. However, the Party explained that it will address the recommendation in the next NIR
L.14	4.C.1 Grassland remaining grassland – CO <sub>2</sub> (97, 2014) Transparency*	Include in the NIR the information provided during the review of the reporting of carbon stock gains in soils from areas under biodiverse pastures to increase transparency	Not resolved Portugal has not included the requested information (i.e. that the sowing of pasture started in the 1990s and remained very low until 1995, and that the area subject to sowing in the pre-1990 period was not significant; therefore, the activity sowing of biodiverse pastures in 1990 was reported as “zero”). In addition, the Party has not provided or referenced in the NIR the data on the expansion of the activity, as well as the system of financing biodiverse sowing in

ID#	Issue and/or problem classification <sup>a,b</sup>	Recommendation made in previous review report	ERT assessment and rationale
the country			
Waste			
W.1	5. General (waste) – general (102, 2014) Consistency	Address the time-series consistency issues separately for each category, explaining how time-series consistency is ensured when combining the data from different sources, and explain the reasoning for the choice of methods used to estimate missing data	Resolved Portugal revised the AD for municipal waste and sectoral waste, following a methodological change made by the National Statistics Institute in 2012. Section 7.2 of the NIR describes in detail the revision. The information provided on data revisions includes explanations for the assumptions used and recalculations made to improve time-series consistency
W.2	5.A Solid waste disposal on land – CH <sub>4</sub> (104, 2014) Accuracy	Review the parameters applied in the first-order decay (FOD) method taking into account the national circumstances	Resolved Portugal revised the parameters according to the 2006 IPCC Guidelines. Sections 7.3.2.3 and 7.3.2.3.1 of the NIR provide detailed explanations
W.3	5.D Wastewater treatment and discharge – N <sub>2</sub> O (106, 2014) Transparency	Update the description of the estimation methodology, including any methodological changes related to the estimates of N <sub>2</sub> O emissions from human sewage	Resolved Information has been included in section 7.6.2.3 of the NIR
KP-LULUCF			
KL.1	General (KP-LULUCF) – CO <sub>2</sub> (111, 2014) Accuracy*	Continue to develop the land area identification system for Madeira to ensure that the land use and land-use change identification system meets the indicated area requirements	Not resolved The method for identify land use change for Madeira still provides low resolution (i.e. areas of 6.25 ha)
KL.2	General (KP-LULUCF) – CO <sub>2</sub> (112, 2014) Accuracy	Develop the estimation system for carbon stock changes in mineral soils, as indicated in paragraph 95 of the 2014 ARR	Addressing This recommendation refers to paragraph 95 of the 2014 ARR and is being evaluated in L.12 above
KL.3	General (KP-LULUCF) – CO <sub>2</sub> (113, 2014) Not a problem	Conduct an uncertainty analysis of the estimates for the emissions/removals from activities under Article 3, paragraph 3 and 4, of the Kyoto Protocol	No longer relevant No specific requirements for the uncertainty analysis for KP-LULUCF activities exist. The uncertainties source and pool categories for the LULUCF

<i>ID#</i>	<i>Issue and/or problem classification<sup>a,b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
			sector, covering source and pool categories considered under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, are considered under the LULUCF sector

*Abbreviations:* AD = activity data, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU = European Union, EU ETS = European Union Emissions Trading System, F-gas = fluorinated gas, FAO = Food and Agriculture Organization of the United Nations, FMRL = forest management reference level, GHG = greenhouse gas, , IEA = International Energy Agency, IEF = implied emission factor, IFA = International Fertilizer Industry Association, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LPG = liquefied petroleum gas, LULUCF = land use, land-use change and forestry, MAI = mean annual increment, NCV = net calorific value, NFI = national forest inventory, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

<sup>a</sup> References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue was raised. Issues are further classified as defined in decision 13/CP.20, annex, paragraph 81. In the review of the supplementary information reported in accordance with Article 7, paragraph 1, of the Kyoto Protocol, the ERT has applied the classification in decision 22/CMP.1, annex, paragraph 69, in conjunction with decision 4/CMP.11.

<sup>b</sup> An asterisk is included next to each issue type for all issues that are also problems, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

#### **IV. Issues identified in three successive reviews and not addressed by the Party**

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2015 annual submission of Portugal, and have not been addressed by the Party.

Table 4

##### **Issues identified in three successive reviews and not addressed by Portugal**

<i>ID#<sup>a</sup></i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed</i>
<b>General</b>		
G.3	Revise and update the uncertainty data for the AD and EFs	3 (2013–2015/2016)
G.6	Improve the archiving system by providing further description of the record-keeping and archiving procedures	3 (2013–2015/2016)
<b>Energy</b>		
E.5	Implement the planned revision and further development of the reporting of feedstocks and non-energy use of fuels and	3 (2013–2015/2016)

<i>ID#<sup>a</sup></i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed</i>
	explain transparently the estimates and notation keys reported in CRF table 1.A(d)	
E.16*	Continue with the efforts to develop country-specific CO <sub>2</sub> EFs for gasoline and diesel oil, and investigate the possibility of obtaining a country-specific CO <sub>2</sub> EF for the gasoline and diesel oil reported under the EU ETS	3 (2012, 2014 and 2015/2016)
<b>IPPU</b>		
I.2	Include information in the NIR on specific QA/QC activities for industrial processes, for example for limestone and dolomite use and for glass production (reported under other mineral products) for which this information is not currently included	3 (2013–2015/2016)
I.4	Ensure the consistency of the entire time series in order to avoid differences in the IEF between the periods 1990–2004 (and 2005) and 2006 onwards	3 (2013–2015/2016)
<b>Agriculture</b>		
	No such issues for the agriculture sector were identified	
<b>LULUCF</b>		
	No such issues for the LULUCF sector were identified	
<b>Waste</b>		
	No such issues for the waste sector were identified	
<b>KP-LULUCF</b>		
	No such issues for KP-LULUCF activities were identified	

*Abbreviations:* AD = activity data, CRF = common reporting format, EF = emission factor, IEF = implied emission factor, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, QA/QC = quality assurance/quality control.

<sup>a</sup> An asterisk is included after any issue ID# where the underlying issue is related to accuracy or completeness of a key category, a missing category or a potential key category, as indicated in decision 13/CP.20, annex, paragraph 83.

## V. Additional findings made during the 2015 technical review

10. Table 5 contains findings made by the ERT during the technical review of the 2015 annual submission of Portugal that are additional to those identified in table 3 above.



Table 5

**Additional findings made during the 2015 technical review of the annual submission of Portugal<sup>a</sup>**

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue<sup>b</sup> and/or a problem<sup>c</sup>? If yes, classify by type</i>
General			
G.8	Follow-up to previous reviews	<p>Portugal has included in the NIR (chapter 10, table 10.1) information describing the status of implementation of recommendations from previous reviews. The content of the table appears to be a preliminary version, which does not include all of the actions undertaken by the Party since the previous submission</p> <p>In response to a question raised by the ERT during the review, Portugal provided an updated version of the table with detailed descriptions of the status of implementation of the previous recommendations and references to the relevant chapters in the NIR</p> <p>The ERT encourages Portugal to include a detailed and updated table with information describing the status of implementation of recommendations from previous reviews</p>	Not an issue
G.9	Key category analysis	<p>The 2006 IPCC Guidelines recommend that the disaggregation level of approach 1 should be done at the aggregation level of table 4.1 (volume 1, chapter 4), with further disaggregation of significant categories only. Portugal developed its key category analysis with a very high level of disaggregation, which may lead to the incorrect identification of key categories. The fact that the uncertainty analysis is performed at a more disaggregated level is not in itself a reason to perform the key category analysis for tier 1 at the same level of disaggregation</p> <p>The ERT encourages Portugal to perform its key category analysis using the level of disaggregation recommended by the 2006 IPCC Guidelines, with further disaggregation only when subcategories are particularly significant</p>	Not an issue
G.10	Key category analysis	<p>During the review, Portugal provided to the ERT a spreadsheet with the calculations of the key category analysis. The ERT noted some calculations errors leading to the incorrect identification of key categories</p> <p>In response, Portugal explained that these errors were related to compilation errors in the signs for estimated gains and losses in carbon for some LULUCF categories (4.A, 4.B and 4.C), and that it will revise the KCA in the next submission</p> <p>The ERT recommends that Portugal correct the calculation errors for LULUCF categories 4.A, 4.B and 4.C in the KCA</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
G.11	National system	<p>The ERT noted that the information provided in the NIR on the institutional arrangements is less detailed than that provided in the NIR of the previous submission, and does not include a table listing bodies and attributions. The NIR (section 1.2.1) mentions a new legal national arrangement (Resolução) to take into account recent developments at the international level and a new Council of Ministers Resolution which restructured SNIERPA (the National System for the Estimation of Emissions by Sources and Removals by Sinks of Air Pollutants) and a set of implementing procedures that were agreed by SNIERPA. However, it does not elaborate on the actual changes, only mentioning that the changes refer to an update to and enlargement of the number of institutions that are part of the national system and the reassignment of experts acting as focal points</p> <p>During the review, the Party provided the ERT with additional information on the new legal framework of the national system and provided a detailed table with the list of participating entities and their attributions</p> <p>The ERT recommends that Portugal improve the transparency of the information in the NIR by including a detailed description of the new legal framework and a table with the participating entities and their attributions in its next submission</p>	Yes. Transparency*
G.12	Uncertainty analysis	<p>During the review, the ERT, together with Portugal, identified calculation errors regarding the LULUCF categories and emission/removal totals in the uncertainty analysis. For example, the totals of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O in last row of table L-1 (annex L to the NIR) do not match the total emissions for those gases in the CRF tables for 2014</p> <p>In response, Portugal explained that the totals presented in the last row of table L-1 consider categories not included in the 2014 national totals (i.e. CO<sub>2</sub> emissions from bunkers and biomass). Furthermore, as already pointed out in G.10 above, CO<sub>2</sub> emissions/removals from LULUCF (considered in the uncertainty analysis and KCA) presented some compilation errors related to the signs for estimated gains and losses in carbon for categories 4.A, 4.B and 4.C</p> <p>The ERT recommends that Portugal correct the compilation errors for LULUCF categories 4.A, 4.B and 4.C and withdraw from the uncertainty analysis those categories not included in the 2014 national totals</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
Energy			
E.22	Feedstocks, reductants and other non-energy use of fuels –	<p>CRF table 1.A(d) lists a number of fuels used for non-energy purposes. For 2014, the fuels reported are LPG, naphtha, bitumen, lubricants, other oil and natural gas with the largest amounts being naphtha, LPG and natural gas. However, the table has not been completed since no information has been provided on the CO<sub>2</sub> emissions associated with the non-energy use. In addition, column J</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
	gaseous, liquid and solid fuels – CO <sub>2</sub>	<p>(“Reported CO<sub>2</sub> emissions – reported under: select category(ies) from the category tree”) is empty (e.g. for lubricants, it should have been indicated for 2014 that 28.9 kt CO<sub>2</sub> was included in the inventory under category 2.D.1 (non-energy products from fuels and solvent use – lubricant use))</p> <p>In response, Portugal provided information on where the emissions from non-energy use of fuels in CRF table 1.A(d) were allocated. The Party also informed the ERT that it was not possible to implement any of the QC checks recommended in the 2006 IPCC Guidelines for non-energy use of fuels</p> <p>The ERT therefore recommends that Portugal carry out QC checks for non-energy use of fuels (as prescribed in the 2006 IPCC Guidelines (volume 3, chapter 1.4)) and provide information on the non-energy uses of LPG, naphtha and natural gas and where the emissions, if any, have been included</p>	
E.23	1.A. Fuel combustion – sectoral approach – all fuels – CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that the NIR refers in many places to the Revised 1996 IPCC Guidelines or the IPCC good practice guidance rather than the 2006 IPCC Guidelines. In response, Portugal explained that, in several instances, the NIR was not updated, but that the EFs from the 2006 IPCC Guidelines were used in the emission calculations</p> <p>The ERT recommends that Portugal update the NIR to reflect that methodologies and EFs from the 2006 IPCC Guidelines were used in the calculations in the next submission</p>	Yes. Transparency*
E.24	1.A. Fuel combustion – sectoral approach – all fuels – CO <sub>2</sub>	<p>The ERT noted that Portugal generally used default oxidation factors from the Revised 1996 IPCC Guidelines. According to the 2006 IPCC Guidelines, the default oxidation factor is 1 as the oxidation factor is assumed to be included in the default EFs</p> <p>In response to a question raised by the ERT during the review, the Party explained that it intends to update the default oxidation factor to 1 in the next submission for all fuel combustion categories.</p> <p>Noting that this method led to an underestimation of emissions, the ERT raised this issue in the list of potential problems and further questions. Portugal provided revised estimates using an oxidation factor of 1 that increased emissions by 0.6% in the category 1.A</p> <p>The ERT agreed with the estimates and recommends that in a case where country-specific or plant specific oxidation factors are used, these should be transparently documented for the ERT to assess the accuracy of the emission estimates</p>	Yes. Transparency*
E.25	1.A. Fuel combustion – sectoral approach –	<p>Portugal described on pages 3.28 and 3.29 of the NIR the procedure for handling biodiesel data in the inventory. According to the Party, biodiesel has been mixed with diesel (gas oil) since 2006 and the energy balance provides the data for the total mix of the fuel. All diesel consumption reported in</p>	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
E.26	1.A.1 Energy industries – all fuels – CO <sub>2</sub>	<p>liquid fuels – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O</p> <p>the energy balance therefore contains a percentage of biodiesel. To obtain the amount of pure biodiesel, the inventory team then derives the diesel consumption by subtracting the total biodiesel produced</p> <p>However, the ERT noted that in the Party’s reporting to Eurostat, diesel (gas oil) and biodiesel are reported separately. In response to a question raised by the ERT during the review, the Party provided a spreadsheet comparing the data for diesel (gas oil) and biodiesel reported in the inventory with the amounts reported to Eurostat</p> <p>The ERT encourages that Portugal include in the NIR information on the amount of biodiesel derived from the data of the energy balance and explain the differences with the data from Eurostat</p> <p>Table 3.4 of the NIR shows the plant specific CO<sub>2</sub> emission factors obtained in the EU ETS. For all three fuels listed (hard coal, fuel oil and natural gas) the EFs derived by measurements on the plants are higher than the default values used in the inventory (table 3.3). For natural gas the quality is usually very homogenous</p> <p>During the review, the ERT raised a question as to whether there were data for carbon content available from the gas transmission company and on the reasoning for using IPCC default CO<sub>2</sub> EFs for fuels that are key categories rather than deriving country-specific EFs from the ETS data. In response, Portugal explained that it intends to develop country-specific EFs for natural gas in the near future</p> <p>The ERT recommends that Portugal develop a country-specific CO<sub>2</sub> EF for natural gas and provide further information on the reasons for not deriving country-specific CO<sub>2</sub> EFs for the other fuels (hard coal and fuel oil) that are key</p>	Yes. Accuracy*
E.27	1.A.1 Energy industries and 1.A.2 Manufacturing industries and construction – all fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>In figure 3.11 of the NIR, under section 3.3.1 (category 1.A.1 – energy industries) Portugal showed the trends in the consumption of fuels in non-public generation plants (auto energy producers) up to 2006. The Party explained that owing to a shift in the data allocation in the energy balance made by the General Directorate for Energy and Geology, fuel consumption from 2007 onwards, as provided in figure 3.11, is considered to be “zero” in order to avoid double counting, as auto energy producers are now allocated under their specific industrial category (under category 1.A.2) (see p.3-19 of the NIR)</p> <p>The ERT noted that according to figure 3.11, fuel consumption decreased in the period 1999–2002 (from approximately 4.7 PJ to 1 PJ) and then increased again in the period 2002–2006 (from approximately 1 PJ to 5.2 PJ). In response to a question raised by the ERT during the review, Portugal explained that the variation occurs because the evolution of natural gas consumption in</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
E.28	1.A.1.a Public electricity and heat production – other fuels and biomass – CO <sub>2</sub>	<p>cogeneration associated with the production of electricity was strongly influenced by the separation of cogeneration units in fiscally autonomous companies for the production of electricity and heat. These companies were mainly those included in the IAIT survey (an annual survey of manufacturing industries)</p> <p>The ERT commends Portugal for providing the explanation and recommends that the Party include the information on the consumption of fuels in non-public generation plants (auto energy producers) in the NIR, clarifying the reasons for the variation in the trends in fuel consumption</p> <p>The ERT noted that the documentation for the CO<sub>2</sub> EF for municipal solid waste incineration is not included in the energy chapter and that the description in the waste chapter is not clear</p> <p>In response to a question raised by the ERT during the review, the Party explained that CO<sub>2</sub> emissions related to waste incineration with energy recovery (reported in category 1.A.1.a) result from the combustion of two fuel types (“biomass” and “other fossil fuels”) and provided a spreadsheet with the data used, including the comparison with the IEFs presented in CRF table 1.A(a)</p> <p>The ERT recommends that Portugal improve the transparency of the description of municipal solid waste incineration and provide a clear explanation of how the CO<sub>2</sub> EF was obtained and the fuels considered in the waste incineration process in the next submission</p>	Yes. Transparency*
E.29	1.A.1.b Petroleum refining – liquid fuels – CO <sub>2</sub>	<p>Portugal reported that in 1990 there were three oil refining plants in Portugal. In 1993, one of the plants closed and only two units remain in operation. The ERT noted that the CO<sub>2</sub> EFs from the EU ETS for petroleum refining are used for the two refineries still in operation, while for the closed refinery, the default CO<sub>2</sub> EF from the Revised 1996 IPCC Guidelines were used</p> <p>In response to a question raised by the ERT during the review, the Party provided information on the CO<sub>2</sub> EF used for the two refineries in operation. However, it is not clear which CO<sub>2</sub> EF was used prior to the start of the EU ETS (i.e. before 2005)</p> <p>In order to increase transparency, the ERT recommends that Portugal include in its next NIR the information on the CO<sub>2</sub> EF for petroleum refining used in the two existing plants prior to the start of the EU ETS. In addition, the ERT recommends that Portugal update the EF used for the closed refinery consistent with the EF provided in the 2006 IPCC Guidelines</p>	Yes. Accuracy*
E.30	1.A.1.b Petroleum refining – gaseous fuels – CO <sub>2</sub>	<p>The ERT noted that in 2014, a large amount of gaseous fuel consumption (20.4 PJ) is reported in CRF table 1.A(a); this value is much higher than the gaseous fuels reported as used in refineries according to the Eurostat data. In response, Portugal explained that the data used in the inventory is from ETS and it is considered only natural gas. In order to compare with ETS data, it is needed to</p>	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		<p>consider also the natural gas consumption in cogeneration in the refineries, reported to the Eurostat</p> <p>The ERT encourages Portugal to include in its next NIR the information on the differences between the Eurostat data and the data reported in CRF table 1.A(a) for gaseous fuel</p>	
E.31	1.A.1.c Manufacture of solid fuels and other energy industries – all fuels – CO <sub>2</sub>	<p>The ERT noted that Portugal reported in CRF table 1.A(a) the fuel consumption and the associated emissions for the categories 1.A.1.c.i (manufacture of solid fuels) and 1.A.1.c.iii (other energy industries); however, in the NIR there is no section describing these categories (see E.14 in table 3)</p> <p>In CRF table 1.A(a), the Party reported values for solid fuels for category 1.A.1.c.i (manufacture of solid fuels) for the period 1990–2001; and for the category 1.A.1.c.iii (other energy industries i.e. city gas according to the 2014 NIR), the Party reported values for liquid fuels for the period 1990–1998, and for gaseous fuels for the period 1997–2001. After 2001, no AD was reported under 1.A.1.c.iii (the Party informed in the 2014 NIR that after 2001 no production of city gas occurred in Portugal)</p> <p>During the review, the Party explained that the emissions in category 1.A.1.c.i ( manufacture of solid fuels) are related to coke production in iron and steel production in the period 1990–2001 and provided a spreadsheet with the calculations; however, no explanation related to category 1.A.1.c.iii (other energy industries) was made</p> <p>The ERT recommends that Portugal include in the next NIR a description of both categories (1.A.1.c.i - manufacture of solid fuels; and 1.A.1.c.iii - other energy industries), including the methodology used for estimating emissions, and also taking into consideration the recommendation made in the previous review report (see E.14 in table 3)</p>	Yes. Transparency*
E.32	1.A.2 Manufacturing industries and construction – gaseous fuels – CO <sub>2</sub>	<p>Portugal reported in table 3.64 of the NIR the CO<sub>2</sub> EF for city gas used in manufacturing industries and construction. The ERT noted that the CO<sub>2</sub> EF for city gas is listed as 57.6 kg/GJ, and that this value does not correspond to the EF for gas works gas provided in the 2006 IPCC Guidelines (44.4 kg/GJ). The ERT considered this issue as a potential overestimation of emissions in the base year and included it in the list of potential problems and further questions raised by the ERT during the review</p> <p>In response, Portugal provided revised estimates using the default CO<sub>2</sub> EF from the 2006 IPCC Guidelines. The revised estimates reduced CO<sub>2</sub> emissions for this category from 139.87 to 107.82 kt CO<sub>2</sub> (–23%) in the base year</p> <p>The ERT agreed with the revised estimates and recommends that Portugal report in its NIR, the correct CO<sub>2</sub> EF used to estimate emissions for category 1.A.2</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
E.33	1.A.2 Manufacturing industries and construction – all fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that the EFs used for manufacturing industries and construction (category 1.A.2) (e.g. in tables 3.65, 3.66, 3.67, 3.70 and 3.71) are from the Revised 1996 IPCC Guidelines</p> <p>In response to a question raised by the ERT during the review, Portugal informed the ERT that some EFs were updated in the calculations, but not in the NIR, and that other EFs referenced to the Revised 1996 IPCC Guidelines were used in the calculations (in the CRF tables) and that Portugal will update them to the EFs from the 2006 IPCC Guidelines in its next submission</p> <p>The ERT recommends that Portugal update the EFs according to the 2006 IPCC Guidelines for category 1.A.2 in its next submission and to accurately reflect the EFs used in the NIR</p>	Yes. Accuracy*
E.34	1.A.2.a Iron and steel – all fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT found that the description of the estimation of emissions from iron and steel production (category 1.A.2.a) in the NIR was unclear and that it was not possible to reproduce the values reported in the CRF tables based on the information provided in the NIR</p> <p>In response, Portugal explained that the methodology is “CO<sub>2</sub> Emission = Fuel Consumption x Low Heating Value x Emission Factor x Oxidation Factor”. From 2005 onwards, fuel consumption has been obtained from the EU ETS for all the plants. From 2002 to 2004, data has been backcasted based on the iron and steel production of each plant (fuel in year 2002 = fuel in year 2005 x steel production in year 2002/ steel production in year 2005). Since then, it has been streamlined with energy balance fuel consumption related to iron and steel consumption, and the remaining values have been estimated (remaining fuel = energy balance fuel consumption – large point source ETS fuel consumption). Low heating values, CO<sub>2</sub> emission factors and oxidation factors in the period 2002-2005 are assumed to be equal to the value verified in 2005. From 2005 onwards, low heating values, CO<sub>2</sub> emission factors and oxidation factors are obtained from the EU ETS</p> <p>The Party also explained that from 2002 onwards, large point sources CH<sub>4</sub> emissions from iron and steel production are based on monitoring data and reported in source code 2.C.1. It is made a streamline with energy balance fuel consumption related to iron and steel consumption, and estimated the remaining values (remaining fuel = energy balance fuel consumption – large point source ETS fuel consumption). To the remaining fuel it has applied IPCC Guidelines emission factors</p> <p>For N<sub>2</sub>O, it is considered the fuel consumption (both EU ETS and remaining fuel after streamlining with Energy Balance) and applied IPCC Guidelines emission factors</p> <p>The ERT recommends that Portugal improve the description for this category by including the information on the method used to calculate the emissions for iron and steel production in the next NIR. The ERT also recommends that the Party revise its CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emission estimates by</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		updating the EFs according to the 2006 IPCC Guidelines for those fuels where Portugal still uses the 1996 IPCC Guidelines	
E.35	1.A.2.b Non-ferrous metals – all fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The Party reported emissions for non-ferrous metals (category 1.A.2.b) as “IE” in CRF table 1.A(a). During the review, Portugal explained that emissions from non-ferrous metals are reported under category 1.A.2.g.i (manufacturing of machinery); and that it is not possible to separate the data for non-ferrous metals from the data for metallurgy industries in the energy balance</p> <p>The ERT recommends that Portugal include the explanation for the use of the notation key “IE” for this category in the CRF tables, explaining that the emissions from non-ferrous metals are reported under the category manufacturing of machinery (1.A.2.g.i)</p>	Yes. Transparency*
E.36	1.A.2.c Chemicals – other fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>Portugal reported in CRF table 1.A(a) the AD for consumption of other fossil fuels under category 1.A.2.c (chemicals). However, there was no clear information in the NIR on which fuels are included under other fossil fuels. The ERT also noted that table 3.24 of the NIR provides information on the flared amount of fuel, but it is not clear where this consumption and the associated emissions are reported</p> <p>In response to a question raised by the ERT during the review, Portugal informed the ERT that “other fossil fuels” correspond to “residual gas” as reported in tables 3.22 and 3.24 of the NIR, and that the flared related consumption and associated emissions are reported under category 1.A.2.c (chemicals)</p> <p>The ERT recommends that Portugal clarify in the NIR that other fossil fuels in the CRF table 1.A(a) correspond to residual gas (as tables 3.22 and 3.24 of the NIR) and where the flared amount of residual gas and emissions are reported. The ERT also encourages Portugal to develop a correspondence table between the IPCC allocation of fuels and the Party’s allocation of fuels and include it in the NIR in order to increase the transparency of reporting in the energy sector</p>	Yes. Transparency*
E.37	1.A.2.f Non-metallic minerals – all fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that the overall energy consumption for the category non-metallic minerals decreased by 40.0% during the period 2007–2014. The main fuels are liquid fuels and gaseous fuels. Liquid fuels decreased by 28.3% between 2007 and 2014, and were replaced by gaseous fuels and, more recently, by other fossil fuels, while solid fuels decreased to a minimal level of consumption (7.5 TJ) in 2014. Biomass decreased by 81% between 2010 (16,389 TJ) and 2011 (3,072 TJ) and by 42% between 2011 and 2014 (1,758 TJ). The ERT observed that the trend of several IEFs was very variable</p> <p>During the review, the Party explained that (1) coal and coke are consumed as additives (non-energy use) to produce coloured glass and are not used as fuel; (2) since 2005, a plant with a higher CH<sub>4</sub> EF</p>	Yes. Comparability*



ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
E.38	1.A.3.a Domestic aviation – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>has become less relevant in terms of production of clinker; (3) the reason for the increase in the N<sub>2</sub>O IEF since 2005 was the introduction of new fuels (industrial waste) in cement plants; and (4) for biogenic emissions from biomass and fossil from other fuels, the Party did not apply the same fraction of biomass to fuel consumption, which is reported fully under other fuels</p> <p>The ERT recommends that Portugal correct the allocation of emissions: emissions from the non-energy use of coal and coke consumed as additives (to produce coloured glass ) should be reported in CRF table 2.A.3 instead of in CRF table 1.A.2.f. The ERT also recommends that Portugal include the explanations regarding the introduction of industrial waste and the rate of biogenic and fossil fuel use in the NIR</p> <p>The ERT noted that the jet kerosene consumption for 1990 is significantly higher than that for the subsequent years. This is also reflected in the domestic share of aviation, which for 1990 is 13.5%, while the average for the following five years is 11.1%</p> <p>In response to a question raised by the ERT during the review, Portugal identified an error in the compilation of cruise consumption at airports in Azores and Madeira for 1990 and provided a spreadsheet with the corrected jet kerosene consumption</p> <p>The ERT added this issue to the list of potential problems and further questions, as it could lead to an overestimation of emissions for the base year. In response, the Party submitted revised estimates correcting the identified error. The revised estimates provided by Portugal reduced CO<sub>2</sub> emissions in the aviation sector from 228 568 to 177 818 kt CO<sub>2</sub> eq (–22.2%) in 1990</p> <p>The ERT agrees with the revised estimates and recommends that Portugal update the NIR with the correct AD for consumption at airports in Azores and Madeira for 1990</p>	Yes. Transparency*
E.39	1.A.3.b Road transportation – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>Portugal reported in the NIR (annex E, p.3-104) the values of fuel consumption for road transportation. The ERT applied the methodology to determine how the fuel consumption values reported in CRF table 1.A(a) for road transportation were derived. The ERT found that the difference for diesel was significant</p> <p>In response to a question raised by the ERT during the review, the Party explained that for diesel consumption, an incorporation rate for biodiesel of 6.31% was applied (see NIR table 3.11, p.3-29). This rate, applied to the value presented in the energy balance, provides a value of 3 771 816 toe of pure diesel, which, when converted to TJ, provides the same value reported in CRF table (157 918.39 TJ)</p> <p>The ERT recommends that Portugal include a detailed explanation of the fuel consumption for road</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		transportation, including how the use of biofuels is considered, in the NIR of the next submission	
E.40	1.A.3.d Domestic navigation – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that the gross tonnage for each ship type for domestic navigation is not clear in the NIR</p> <p>In response to a question raised by the ERT during the review, the Party explained that shipping activities take into account detailed ship movements and technical information on the ships (e.g. gross tonnage, ship type and speed). These data are sent to the inventory team by national seaports. The Party also explained that for each dock (presented in NIR table 3.110, which includes one arrival and one departure) it is possible to calculate national and international distance and consumption. The Party also explained that the annual number of dockings are not directly related to the variation in fuel consumption. The variations are in fact related to the characteristics of the ships and the distance travelled. The national seaports considered are the 13 listed in NIR table 3.110. For the Azores Islands, only the movements in Ponta Delgada port and the Azores inter-island transport that docks in Ponta Delgada are considered. Ponta Delgada is the principal port in the Azores Islands; other ports are considered of minor relevance</p> <p>The ERT recommends that Portugal include in the NIR the information provided to the ERT during the review on how the gross tonnage for each ship type is calculated and the description of the methodology for estimating emissions from domestic navigation in the next NIR</p>	Yes. Transparency*
E.41	1.A.4.b Residential – liquid fuels – CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that Portugal used the same CH<sub>4</sub> and N<sub>2</sub>O LPG EFs for the residential sector (NIR, table 3.121) as for the services sector reported in the 2006 IPCC Guidelines (table 2.10). In response to a question raised by the ERT during the review, the Party informed the ERT that this was an update error and that the EF for LPG should be 1.0 g/GJ for CH<sub>4</sub> and 1.0 g/GJ for N<sub>2</sub>O (and not 0.9 g/GJ for CH<sub>4</sub> and 4.0 g/GJ for N<sub>2</sub>O) and that this will be corrected in the NIR and the CRF tables in the next submission</p> <p>The ERT recommends that Portugal revise the CH<sub>4</sub> and N<sub>2</sub>O estimates for liquid fuels for category 1.A.4.b by correcting the CH<sub>4</sub> and N<sub>2</sub>O EF for LPG</p>	Yes. Accuracy*
E.42	1.B.1.a Coal mining and handling – solid fuels – CO <sub>2</sub> and CH <sub>4</sub>	<p>The ERT noted that the AD for coal mining and handling are not included in CRF table 1.B.1 and that figure 3.82 of the NIR (p.3-139) incorrectly shows crude oil instead of coal extracted from mines. The ERT also noted that the EFs for fugitive emissions from coal mining (NIR table 3.130) are from the Revised 1996 IPCC Guidelines</p> <p>In response to a question raised by the ERT during the review, the Party provided a spreadsheet with the correct AD and using the EFs from the 2006 IPCC Guidelines.</p> <p>The ERT recommends that Portugal report the correct AD in figure 3.82 of the NIR and apply the</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		EFs from the 2006 IPCC Guidelines in its next submission	
E.43	1.B.1.a Coal mining and handling – solid fuels – CO <sub>2</sub> and CH <sub>4</sub>	<p>It is not clear based on the NIR whether there were additional mines to the two that were operating in 1990, which were abandoned at an earlier time (see section 3.3.6.1). The Party reported AD and emissions for abandoned coal mines from 1993 onwards, but the methodology used to estimate the emissions requires information on the number of mines closed from 1901 onwards</p> <p>In response to a question raised by the ERT during the review, the Party explained that the number of mines will be clarified over the course of the next year in consultation with the General Directorate for Energy and Geology</p> <p>The ERT recommends that Portugal clarify whether there were coal mines abandoned from 1901 to 1993 in the country and inform accordingly in the NIR</p>	Yes. Transparency*
E.44	1.B.2.a Oil – liquid fuels – CO <sub>2</sub> and CH <sub>4</sub>	<p>The ERT noted that Portugal did not calculate CO<sub>2</sub> emissions from the category oil transport (1.B.2.a.3) even though a default EF is provided in the 2006 IPCC Guidelines. Portugal explained that the emissions would be estimated in the next submission. The resulting emissions may be small but Portugal did not provide evidence in the NIR for their exclusion in terms of the likely level of emissions as well as the disproportionate amount of effort required to collect the necessary data (see paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines)</p> <p>Therefore, the ERT recommends that Portugal calculate and report CO<sub>2</sub> emissions from oil transport using either the default CO<sub>2</sub> EF from the 2006 IPCC Guidelines or any country-specific EF available, and, in the case where a disproportionate amount of effort is required to collect the necessary data, provide justification for excluding the emissions in terms of the likely level of emissions</p>	Yes. Completeness*
E.45	1.B.2.b Natural gas – gaseous fuels – CO <sub>2</sub> and CH <sub>4</sub>	<p>Portugal reported that all natural gas used in the country is imported and received through shipping as LNG, and that it is regasified in a plant in Sines in southern Portugal. To calculate the fugitive CH<sub>4</sub> emissions from natural gas, the Party assumes that the gas lost in transport and distribution is equivalent to the amount of natural gas reported as losses in the energy balance</p> <p>The ERT noted that there is no information in the NIR on the amount of natural gas lost as reported in the energy balance. As all gas is imported through the plant in Sines, the current methodology used seems to significantly overestimate the fugitive CO<sub>2</sub> emissions from natural gas. During the review, Portugal explained that it intends to review the methodology, including updating it to the one provided in the 2006 IPCC Guidelines</p> <p>Therefore, the ERT recommends that Portugal review the methodology used to estimate CO<sub>2</sub> and CH<sub>4</sub> fugitive emissions of natural gas in order to avoid an overestimation of emissions and apply the</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		methods in accordance with 2006 IPCC Guidelines, and explain the methodology used in its NIR	
E.46	1.B.2.d Other (oil, natural gas and other emissions from energy production) – CO <sub>2</sub>	<p>Portugal reported emissions from geothermal energy production in this category. The NIR describes how this is not envisaged in the CRF tables. However, this description is incorrect, since the CRF tables specifically state that emissions from geothermal energy production could be reported under category 1.B.2.d (other). Therefore the allocation of geothermal energy production under category 1.B.2.d (other) is foreseen in the CRF tables and Portugal reported correctly</p> <p>The ERT also noted that there are large variations in the CO<sub>2</sub> emissions from 2008 to 2011 owing to the different flow of CO<sub>2</sub> emitted by each geothermal well and the flexible operating regime of the geothermal plant</p> <p>The ERT recommends that Portugal provide detailed information on the flows and operating regimes and on how the CO<sub>2</sub> EFs is derived in its next NIR</p>	Yes. Transparency*
IPPU			
I.10	2. General (IPPU) – indirect CO <sub>2</sub>	<p>The ERT noted that in CRF table 6 Portugal reported 46.35 kt CO<sub>2</sub> of indirect emissions from the IPPU sector for 2014. The ERT was not able to replicate the value. Following a request made by the ERT, Portugal informed the ERT that this was a compilation error and that the correct value for 2014 is 67.6 kt CO<sub>2</sub>. The differences refer to category 2.B.10.d (solvent use in plastic products manufacturing): in the CRF tables these emissions were incorrectly considered as direct CO<sub>2</sub> emissions, but in the NIR they were correctly presented as indirect CO<sub>2</sub> emissions (see also I.11 and I.30)</p> <p>The ERT recommends that Portugal report the correct values of indirect CO<sub>2</sub> emissions in CRF table 6 in its next submission</p>	Yes. Comparability*
I.11	2. General (IPPU) – all gases	<p>The ERT noted that Portugal did not estimate emissions from the following categories:</p> <ol style="list-style-type: none"> <li data-bbox="712 1142 1659 1310">(1) CO<sub>2</sub> emissions from rock wool production (under category 2.A.3 – glass production) <ul style="list-style-type: none"> <li data-bbox="741 1190 1682 1310">• During the review, Portugal informed the ERT that there are two plants that produce rock wool and that the Party is planning to report these emissions in the next submission. CO<sub>2</sub> emissions from rock wool production is probably insignificant (paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines)</li> </ul> </li> <li data-bbox="712 1334 1693 1407">(2) CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from ammonium sulphate production (category 2.B.10.b) <ul style="list-style-type: none"> <li data-bbox="741 1382 1727 1407">• In the CRF tables, the AD are reported as confidential. In the NIR (p.4-37), Portugal</li> </ul> </li> </ol>	Yes. Completeness*

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I.12	2.A.2 Lime	<p>stated that information on this category will be provided in the next submission</p> <p>(3) CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from explosives production (category 2.B.10.c)</p> <ul style="list-style-type: none"> <li>• In the CRF tables, the AD and the SO<sub>x</sub> and NO<sub>x</sub> emissions are provided, but no methodology is presented in the NIR. In the NIR (p.4-38), Portugal stated that information on this category will be provided in the next submission</li> </ul> <p>(4) CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from solvent use in plastic products manufacturing (category 2.B.10.d)</p> <ul style="list-style-type: none"> <li>• In the NIR (p.4-38), Portugal stated that information on this category will be provided in its next submission. However, the CO<sub>2</sub> emissions are reported in the CRF tables (while the CH<sub>4</sub> and N<sub>2</sub>O emissions are reported as “NO”). In response to a question during the review, Portugal informed the ERT that the CO<sub>2</sub> emissions included in the CRF tables are indirect CO<sub>2</sub> emissions (see I.10 and I.30)</li> </ul> <p>(5) HFC, PFC, SF<sub>6</sub> and NF<sub>3</sub> emissions from integrated circuits or semiconductors (category 2.E.1)</p> <ul style="list-style-type: none"> <li>• In the NIR (p.4-87) Portugal stated that this category will be fully addressed in future submissions. During the review, Portugal informed the ERT that it will collect production data over the course of the next year</li> </ul> <p>(6) PFC, SF<sub>6</sub> and NF<sub>3</sub> emissions from TFT flat panel display (category 2.E.2)</p> <ul style="list-style-type: none"> <li>• In the NIR (p.4-87), Portugal explained that this category will be fully addressed in future submissions. In response to a question raised during the review, Portugal stated that there is no such production in the country. This inconsistency in the information provided requires further clarification from Portugal</li> </ul> <p>The ERT recommends that Portugal include the emission estimates for the categories 2.A.3, 2.B.10.b, 2.B.10.c, 2.B.10.d, 2.E.1 and 2.E.2 in its next submission of the inventory. If emissions from any of these categories do not occur in the country (e.g. for TFT flat panel displays), the ERT recommends that Party use the appropriate notation key (“NO”) in the CRF tables, together with an explanation in the NIR for this assessment. If the emissions from any of these categories are judged insignificant in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, the ERT recommends that the Party use the appropriate notation key (“NE”) in the CRF tables, providing a qualitative and quantitative justification in the NIR</p>	Yes. Adherence to

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	production – CO <sub>2</sub>	<p>submission. The CO<sub>2</sub> emissions were calculated for three industrial sectors: dedicated plants (NIR section 4.3.2, p.4-7), the iron and steel sector, and the pulp and paper sector (NIR section 4.3.3, p.4-11). The ERT noted that the CO<sub>2</sub> emission estimates for each sector are based on different methodologies and EFs. Following a request made by the ERT, the Party provided a spreadsheet with values for the AD, EFs and CO<sub>2</sub> emissions for each of the three sectors</p> <p>Based on the data presented in the spreadsheet, the ERT noted a significant variation in the IEF (from 0.24 t CO<sub>2</sub>/t CaCO<sub>3</sub> for 2007 to 1.14 t CO<sub>2</sub>/t CaCO<sub>3</sub> for 2011) at one of the dedicated lime production plants. In addition, another plant has a very low IEF of 0.15 t CO<sub>2</sub>/t CaCO<sub>3</sub> for 2005, which increased to 0.27 t CO<sub>2</sub>/t CaCO<sub>3</sub> for 2014. In response, Portugal explained that both the CaCO<sub>3</sub> consumption and CO<sub>2</sub> emissions were obtained directly from the EU ETS for all dedicated lime production plants. Although the CO<sub>2</sub> emission values are correct, the Party confirmed that the CaCO<sub>3</sub> consumption is not correct and that it will make the necessary corrections in the next submission</p> <p>The ERT recommends that Portugal update the NIR and the CRF tables with the correct AD (CaCO<sub>3</sub> consumption) for dedicated plants</p>	UNFCCC Annex I inventory reporting guidelines
I.13	2.A.2 Lime production – CO <sub>2</sub>	<p>In response to a question raised by the ERT, the Party also confirmed that it did not apply any correction for LKD and for hydrated lime for the AD used in the estimation of CO<sub>2</sub> emissions from lime used in iron and steel plants</p> <p>The ERT recommends that Portugal apply the correction for LKD and for hydrated lime in the lime used in iron and steel plants in its next submission</p>	Yes. Accuracy*
I.14	2.A.2 Lime production – CO <sub>2</sub>	<p>Portugal reported in the NIR (sections 4.3.2 and 4.3.3) CO<sub>2</sub> emissions from lime production in dedicated plants (those included under the EU ETS), in the iron and steel sector and in the pulp and paper sector. However, the ERT noted that emissions from other sectors (e.g. lime production in sugar mills, artisanal production of lime for sanitation purposes or for whitewash, etc.) should also be included in category 2.A.2 (lime production)</p> <p>In response to a question raised by the ERT during the review, Portugal informed the ERT that emissions from lime production in sugar mills, and artisanal production of lime for sanitation purposes or for whitewash are not quantified in the national inventory and will address these sectors in the future submissions</p> <p>The ERT recommends that Portugal investigate whether lime production in sugar mills, and artisanal production of lime for sanitation purposes or for whitewash are potential activities and, in cases where such activities are present, provide estimates of CO<sub>2</sub> emissions</p>	Yes. Completeness*

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I.15	2.A.2 Lime production – CO <sub>2</sub>	<p>Portugal reported in the NIR (section 4.3.2.4) that for lime production in dedicated plants for the period 1990–2009, the AD were obtained from the INE/IAPI industrial survey and “corrected” using production data from the facilities. However, the ERT noted that the Party did not provide information on how the correction of the AD was made, how the data provided by the facilities were collected and what types of data (e.g. kiln type, lime production, LKD, lime humidity) were collected from the facilities</p> <p>During the review, Portugal informed the ERT that the lime production data obtained directly from each plant were higher than the values from the national statistics. From 2010 onwards, Portugal used lime production data provided under the Pollutant Release and Transfer Register (PRTR) for each plant. For the period 1990–2009, Portugal used the ratio between the 2010 PRTR values and the values from the national statistics and backcasted the 2010 PRTR values based on the national statistics trend for the period 1990–2009</p> <p>The ERT recommends that Portugal improve the description of the method used (i.e. how the correction of the AD was made, how the data provided by the facilities were collected and what types of data (e.g. kiln type, lime production, LKD, lime humidity) were collected from the facilities) in the next NIR</p>	Yes. Transparency*
I.16	2.A.2 Lime production – CO <sub>2</sub>	<p>During the review Portugal informed the ERT (see I.15 above) that it used the ratio between the 2010 PRTR values and the values from the national statistics and backcasted the 2010 PRTR values based on the national statistics trend for the period 1990–2009</p> <p>The ERT is of the view that using the value from one single year (2010) for backcasting will introduce a bias in the estimation of the AD</p> <p>The ERT recommends that Portugal use an approach consistent with the 2006 IPCC Guidelines (e.g. use additional years) for backcasting the AD</p>	Yes. Accuracy*
I.17	2.A.2 Lime production – CO <sub>2</sub>	<p>In the NIR (section 4.3.3.4.1), Portugal reported that AD for lime production in the iron and steel industry were available from information received from the industry for the period 1991–1994. For the remaining years of the time series, annual lime production, for which data were unavailable, was forecasted using energy consumption as a surrogate indicator and using the lime production data from 1994 received from the industry</p> <p>Following a request made by the ERT for additional information on the data considered as a surrogate indicator, Portugal provided a spreadsheet indicating that energy consumption was used as a surrogate indicator to extrapolate the AD for the period 1995–2001 for the iron and steel plants. However, Portugal did not provide the ERT with justification for using energy consumption in iron</p>	Yes. Accuracy*

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		<p>and steel plants as a driver, or for using the AD from 1994 to extrapolate the AD for the years 1995–2001</p> <p>The ERT recommends that Portugal assess the methodology used for the extrapolation of AD for the period 1995–2001 using different surrogate data and present the results in the next submission, in order to improve the transparency and accuracy of the reporting, and use a forecasting method in accordance with the 2006 IPCC Guidelines in the estimations</p>	
I.18	2.A.2 Lime production – CO <sub>2</sub>	<p>In the NIR (section 4.3.3.2, p.4-12), Portugal calculated emissions from lime production in pulp and paper production based on the following equation: <math>EmiCO_2(y) = 44/12 * MatCarb(m,y) * Ccontent(m) * 10^{-3}</math>, where content (m) represents the carbon content of material m consumed in year y. In tables 4.5 and 4.6 of the NIR, Portugal expressed the values in t CO<sub>2</sub>/t material m instead of t C/t material m. During the review, Portugal informed the ERT that there was an error in the description provided in the NIR, but that the emission estimates were correct</p> <p>The ERT recommends that Portugal report the correct unit for the carbon content of raw material in its next NIR</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.19	2.A.3 Glass production – CO <sub>2</sub>	<p>In the NIR (section 4.3.4, p.4-14), Portugal reported that “in the period 1990–2004 CO<sub>2</sub> emissions from glass production were estimated assuming the same ratio between CO<sub>2</sub> emissions and the production of each type of glass (flat, container and crystal) verified in year 2005 multiplied by the production verified in each year and divided by the production of glass verified in 2005”. However the ERT could not find any clarification about this methodology in the NIR</p> <p>During the review, Portugal explained that it will clarify this methodology and provide a more detailed description in its next NIR. Portugal informed the ERT that the formulae used were: (1) raw material (1990) = raw material (2005) x glass production (1990)/glass production (2005); and (2) CO<sub>2</sub> (1990) = raw material (1990) x EF (stoichiometry) x conversion factor. Portugal also explained that the glass production totals considered in the estimates are those related to the type of glass produced in each plant. If the plant produces flat glass, then flat glass production is used in the calculations</p> <p>The ERT recommends that Portugal describe in the NIR the detailed methodology and assumption considered in the CO<sub>2</sub> emissions estimates of glass production</p>	Yes. Transparency*
I.20	2.A.3 Glass production – CO <sub>2</sub>	<p>Portugal estimated CO<sub>2</sub> emissions for three types of glass: flat glass, container glass and lead crystal glass. Flat production ceased in 2009. The ERT noted that Portugal estimated CO<sub>2</sub> emissions from glass production using a tier 3 methodology for the period 2005–2014. For the period 1990–2004, Portugal informed the ERT during the review that the emissions were estimated using data on the</p>	Yes. Transparency*



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I.21	2.A.3 Glass production – CO <sub>2</sub>	<p>glass production and raw material used in 2005</p> <p>The ERT noted that the IEF reported by Portugal for 1990 amounts to 0.46 t CO<sub>2</sub>/t glass produced, which is more than two times higher than the IEFs for 1990 for all the other EU countries, whose reported IEFs range between 0.05 and 0.21 t CO<sub>2</sub>/t glass</p> <p>This high IEF shows a potential overestimation of CO<sub>2</sub> emissions in the original submission for the base year (1990). The ERT included this issue in the list of potential problems and further questions raised by the ERT during the review</p> <p>In response to the list of potential problems, Portugal provided revised estimates and informed the ERT that the values previously reported were not correct and corresponded to CO<sub>2</sub> emissions related to combustion (category 1.A.2.f). The revised estimates of CO<sub>2</sub> emissions provided by Portugal were calculated per type of glass and the IEFs for each type of glass are in the range of those reported by other EU countries. In addition, the corresponding emission amounts are correctly presented in the CRF tables submitted to the secretariat on 22 December 2016</p> <p>The revised estimates reduced CO<sub>2</sub> emissions from this category by –202.92 kt CO<sub>2</sub> eq for 1990 (–70.5%). The ERT considers that the potential overestimation of emissions has been resolved and recommends that Portugal explain the methodology, assumptions, AD and EF used in the CO<sub>2</sub> estimations</p> <p>In response to a question raised by the ERT related to the variations in the IEF for this category for the period 1999–2004 for the three types of glass reported (flat glass, container glass and lead crystal glass), Portugal informed the ERT that the IEF is related to all raw material except the cullet incorporation ratio. However, the ERT noted that Portugal reported in the NIR the cullet ratio for manufacturing of glass, by type of glass and for the whole time series</p> <p>In response to a question raised by the ERT during the review, Portugal explained that the cullet incorporation ratio was not included in the CO<sub>2</sub> emission estimates for the period 1990–2004. The Party used an EU ETS approach, based on raw material consumption, and the EFs used were from the EU ETS and correspond to stoichiometric ratios</p> <p>According to the Party, the increase in cullet incorporation in glass production has an indirect effect in the decrease in other raw material consumption in glass production. For container glass, the cullet incorporation ratio increased from 27.5% for 1990 to 46.4% for 2014. As Portugal did not incorporate the cullet incorporation ratio in the estimates, this explanation justifies the decrease in the IEF</p> <p>The ERT recommends that Portugal clarify the assumptions used for the AD and EFs for this</p>	Yes. Transparency*

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I.22	2.A.4 Other process uses of carbonates – CO <sub>2</sub>	<p>category and include an explanation on how the cullet ratio for manufacturing of glass was considered in the emissions calculations along the time series</p> <p>Portugal reported in the NIR, section 4.3.6 (category 2.A.4.a – other process uses of carbonates, ceramics) that the CO<sub>2</sub> emission estimates result from the calcination of carbonates in the raw materials (clay as well as additions) used in the production process. From 2013 onwards, data on the raw material consumption and carbon content were obtained from EU ETS data. For the plants operating under the EU ETS, the raw material consumption was extrapolated based on the fuel consumption for ceramics reported under the EU ETS and the energy balance. For the plants not covered under the EU ETS, the raw material consumption was extrapolated based on the energy balance (see the equation in section 4.3.6.2 of the NIR)</p> <p>Following a request made by the ERT, the Party provided a spreadsheet that includes information on the energy consumption, raw material consumption, EFs and CO<sub>2</sub> emissions for the whole time series. The ERT noted that to estimate the energy consumption data that were used to extrapolate the data for raw material consumption, Portugal adjusted the energy value for biomass for the period 1990–2010, based on the value from one year only (2011). The ERT is of the opinion that such an adjustment could lead to an underestimation of CO<sub>2</sub> emissions for the same period</p> <p>The ERT recommends that Portugal increase the consistency of the time-series and revise the methodology applied by revising the energy values for biomass (e.g. using a greater number of years as the basis for the adjustment; using plant-specific data; or choosing another approach based on the quantities of raw material consumption and the IEF). The ERT also recommends that the Party provide a justification in the NIR for the methodology applied to estimate emissions</p>	Yes. Consistency*
I.23	2.A.4 Other process uses of carbonates – CO <sub>2</sub>	<p>In the NIR, section 4.3.6 (category 2.A.4.a (other process uses of carbonates – ceramics)) Portugal calculated the emissions based on the following equation: <math>EmiCO_2(y) = 44/12 * MatCarb(m,y) * Ccontent(m) * 10^{-3}</math>, where Ccontent (m) represents the carbon content of material m consumed in year y. In table 4.11 of the NIR, Portugal expressed the values in t CO<sub>2</sub>/t material m instead of t C/t material m. During the review, Portugal informed the ERT that there was an error in the description provided in the NIR, but that the emission estimates were correct</p> <p>The ERT recommends that Portugal apply the correct unit for the carbon content of raw material in table 4.11 of the NIR in its next submission</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.24	2.B.1 Ammonia production – CO <sub>2</sub>	<p>In the NIR (section 4.4.1), Portugal reported that CO<sub>2</sub> emissions from ammonia production were estimated based on feedstock consumption (vacuum residual fuel oil and methanol). The ERT noted that Portugal has not estimated the fuels used for energy purposes for this category. The ERT is of the view that estimating CO<sub>2</sub> emissions based only on feedstock consumption is not in line with the</p>	Yes. Accuracy*

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I.25	2.B.1 Ammonia production – CO <sub>2</sub>	<p>2006 IPCC Guidelines and could lead to an underestimation of emissions. Portugal explained that since 2009 there is no more production of ammonia in the country and that it will revise the information on this sector in future submissions</p> <p>The ERT recommends that Portugal review the methodology used considering that estimating CO<sub>2</sub> emissions based only on feedstock consumption is not in line with the 2006 IPCC Guidelines</p> <p>Ammonia production occurred in Portugal in the period 1990–2009, using vacuum residual fuel oil as the source of hydrogen. The production results in CO<sub>2</sub> as a by-product, which is partly used in the production of urea. The ERT noted that Portugal decided not to deduct that CO<sub>2</sub> from the estimation of CO<sub>2</sub> emissions from ammonia production. In addition, the ERT noted that Portugal estimated and reported CO<sub>2</sub> emissions from the use of urea in the agriculture sector (under category 3.H)</p> <p>During the review, Portugal confirmed that CO<sub>2</sub> is included in both ammonia production and urea application in the agriculture sector. Portugal also informed the ERT that the CO<sub>2</sub> deducted from the emissions from ammonia production will be included in the next submission. The ERT considered that there is a potential overestimation of CO<sub>2</sub> emissions in the original submission for the base year (1990) and included this issue in the list of potential problems and further questions raised by the ERT during the review</p> <p>In response to the list of potential problems and further questions, Portugal provided revised estimates in which the CO<sub>2</sub> emissions recovered for use in urea production were subtracted from the CO<sub>2</sub> emissions from feedstock consumption</p> <p>The revised estimates reduced CO<sub>2</sub> emissions from this category by –29.7 kt CO<sub>2</sub> eq for 1990 (–5.2%)</p> <p>The ERT considers that the potential overestimation of emissions has been resolved and recommend that the Party update the description of the methodology to estimate CO<sub>2</sub> emissions (specially how the CO<sub>2</sub> emissions recovered for use in urea production were subtracted from the CO<sub>2</sub> emissions from feedstock consumption) in the NIR in the next submission</p>	Yes. Transparency*
I.26	2.B.2 Nitric acid production – N <sub>2</sub> O	<p>In the NIR (section 4.4.2), Portugal reported that “weak nitric acid (60%) is produced from ammonia, using catalytic (Platinum-rhodium alloy catalysts) oxidation of ammonia with air to NO<sub>2</sub> at medium pressure, and subsequent absorption with water to form nitric acid in a dual-stage process”</p> <p>The ERT noted that for the estimation of N<sub>2</sub>O emissions, the Party used an EF based on monitoring data from facilities and requested information from the Party on how these EFs were estimated and</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		<p>how the facilities made the emissions monitoring</p> <p>In response, Portugal informed the ERT that the EFs are based on continuous emission monitoring system data and that these emissions are currently monitored by the plants and the N<sub>2</sub>O emissions are reported directly under the EU ETS. The AD considered for the development of the EFs are those where the nitric acid production is at 100%</p> <p>The ERT recommends that Portugal include information on the assumptions for AD and EF and on how the facilities make the emissions monitoring in its next NIR</p>	
I.27	2.B.8 Petrochemical and carbon black production – CO <sub>2</sub>	<p>In Portugal, ethylene is produced using a thermal steam cracking process at one plant. For this category (2.B.8.b – ethylene), the ERT noted that the Party estimated emissions for CH<sub>4</sub> and NMVOCs, but reported the notation key “NO” for CO<sub>2</sub> emissions in CRF table 2(I).A-Hs1. The ERT considered this a potential underestimation of CO<sub>2</sub> emissions, as the 2006 IPCC Guidelines provide a default EF for CO<sub>2</sub> in table 3.14, page 3.75 (volume 3, chapter 3), and included this issue in the list of potential problems and further questions raised by the ERT during the review</p> <p>In response, Portugal provided revised estimates of CO<sub>2</sub> emissions for category 2.B.8.b (ethylene), which amounted to 588.10 kt CO<sub>2</sub> for 1990</p> <p>The ERT considers that the potential underestimation of emissions has been resolved and recommends that Portugal update the description of how these emissions are estimated in the NIR</p>	Yes. Transparency*
I.28	2.B.8 Petrochemical and carbon black production – CO <sub>2</sub> and CH <sub>4</sub>	<p>In the NIR, Portugal explained that the AD for vinyl chloride monomer production (category 2.B.8.c) were obtained from national statistics and that emission estimates will be provided in future submissions</p> <p>The ERT noted that in CRF table 2(I).A-Hs1, Portugal reported CO<sub>2</sub> and CH<sub>4</sub> emissions as “NO”. During the review, Portugal informed the ERT that only indirect CO<sub>2</sub> emissions from NMVOCs were estimated</p> <p>The ERT considered this a potential underestimation of CO<sub>2</sub> and CH<sub>4</sub> emissions as the 2006 IPCC Guidelines provide a methodology and EFs for estimating CO<sub>2</sub> and CH<sub>4</sub> emissions (volume 3, chapter 3, tables 3.17 and 3.19) and included this issue in the list of potential problems and further questions raised by the ERT during the review</p> <p>In response, Portugal provided revised estimates of CO<sub>2</sub> and CH<sub>4</sub> emissions for category 2.B.8.c (vinyl chloride monomer) using the default CO<sub>2</sub> and CH<sub>4</sub> EFs from the 2006 IPCC Guidelines, which amounted to 26.54 kt CO<sub>2</sub> and 0.00034 kt CH<sub>4</sub> for 1990</p> <p>The ERT considers that the potential underestimation of emissions has been resolved and</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		recommends that Portugal update the description of these emissions estimates in its NIR	
I.29	2.B.8 Petrochemical and carbon black production – CO <sub>2</sub>	<p>In the NIR, section 4.4.13 (category 2.B.8.f – carbon black), Portugal reported that there is only one carbon black production plant in Portugal. This plant ceased operation before 2014; however, Portugal reported CO<sub>2</sub> emissions for 2014 in CRF table 2(I).A-Hs1. In response Portugal informed the ERT that the emission value for 2014 should be “zero” and that it will correct this in its next submission</p> <p>The ERT recommends that Portugal correct the CO<sub>2</sub> value reported in CRF table 2(I).A-Hs1, reporting “NO” if the activity does not occur, and also check the values of CH<sub>4</sub> and NMVOC emissions for 2014 accordingly. The ERT also recommends that the Party improve transparency by providing information in the next NIR explaining that carbon black production ceased before 2014</p>	Yes. Comparability*
I.30	2.B.10 Other (chemical industry) – CO <sub>2</sub>	<p>The ERT noted that in the NIR, section 4.4.18 (category 2.B.10.d – solvent use in plastic products manufacturing), Portugal reported that emission estimates will be provided in future submissions. However, the ERT noted that CRF table 2(I).A-H showed CO<sub>2</sub> emission estimates for the whole time series</p> <p>In response, Portugal clarified that it is planning to include a description of the methodology, AD and EFs used in the NIR in future submissions. In addition, the Party explained that there are indirect CO<sub>2</sub> emissions related to NMVOC emissions in this category (see also I.10 and I.11)</p> <p>The ERT recommends that Portugal update the NIR in accordance with the values reported in the CRF tables by providing a transparent explanation of the methodology used for the direct and indirect CO<sub>2</sub> emission estimates from solvent use in plastic products manufacturing</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.31	2.C.1 Iron and steel production – CO <sub>2</sub>	<p>Portugal reported in the NIR (section 4.5.1.1, p.4-38) that in the period 1990–2001 steel from BOF are produced in an integrated iron and steel plant and that the CO<sub>2</sub> emissions from BF gas combustion were quantified under category 1.A.2 (combustion in manufacturing industries and construction). In category 2.C.1 (iron and steel production), only emissions resulting from casting operations and seal leaks at the top of furnaces were quantified</p> <p>The ERT noted that the 2006 IPCC Guidelines recommend that emissions from BF gas must be reported under category 2.C.1 (iron and steel production). In response, Portugal informed the ERT that these emissions occurred only in the period 1990–2001. From 2002 onwards, there is only secondary steel production. The Party also informed the ERT that it will report the emissions under category 2.C.1 (iron and steel production) in future submissions</p> <p>The ERT recommends that Portugal apply the 2006 IPCC Guidelines and reallocate emissions from</p>	Yes. Comparability*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		on-site BF gas combustion to category 2.C.1	
I.32	2.C.1 Iron and steel production – CO <sub>2</sub>	<p>Portugal reported in the NIR (section 4.5.1.2, p.4-39) that CO<sub>2</sub> emissions from sintering production are reported under category 2.A.2 (lime production). However, the ERT could not identify these emissions under category 2.A.2</p> <p>In response to a question raised by the ERT during the review, Portugal informed the ERT that the description in the NIR is incorrect and that it will be corrected in the next submission by explaining in the NIR that “Emissions from sintering are estimated using similar equation” (as on p.4-39 of the 2015 NIR) and “are reported under 2.C.1.d – metal industry, sinter”</p> <p>The ERT recommends that Portugal improve its QA/QC procedures and include information on how emissions from sintering are estimated and allocated in its next NIR</p>	Yes. Transparency*
I.33	2.C.1 Iron and steel production – CO <sub>2</sub>	<p>Portugal reported in the NIR (section 4.5.1.4, p.4-41) that data for the production time series for sinter, pig iron and steel production in BFs were provided by industrial plants for the period 1990–1994 (direct survey conducted by the Agencia Portuguesa do Ambiente ) and from 1995 to 2001, annual values were estimated using coke production as surrogate data; and that steel resulting from BOFs in one iron and steel plant (Seixal) were estimated from production data in 1990 and forecasted until 2001</p> <p>The ERT noted that using coke production as surrogate data to estimate the AD for integrated iron and steel plants is not always relevant, as coke used in BOF steel production could be imported. The ERT considers that more accurate surrogate data could be the quantity of coke used</p> <p>In response to a question raised by the ERT during the review, Portugal provided a file comparing the steel production data used in the GHG inventory with the data presented in the <i>Steel Statistical Yearbook</i> of the World Steel Association.<sup>c</sup> The comparison shows some differences and limitations in the values of the AD: (1) sinter production data (from the Steel Statistical Yearbook) exist only for the period 1990–1994; (2) pig iron production data for 1994 are exactly the same as those verified for 1995; and (3) the values for the steel production data in EAF and BOF are slightly higher in the <i>Steel Statistical Yearbook</i>. Portugal informed the ERT that it will analyse the information contained in the <i>Steel Statistical Yearbook</i> against the estimates provided in the inventory over the course of the next year</p> <p>The ERT commends the Party for the explanation provided and recommends that Portugal make efforts to improve the estimation of the AD for BOF and EAF steel production for the period 1995–2001 and investigate the possibility of using another type of surrogate data for the estimation of the AD and report the conclusions in its next submission</p>	Yes. Accuracy*

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue<sup>b</sup> and/or a problem<sup>c</sup>? If yes, classify by type</i>
I.34	2.C.1 Iron and steel production – CO <sub>2</sub>	<p>Portugal reported in the NIR (section 4.5.1.4, p.4-41) that the AD used for the estimation of CO<sub>2</sub> emissions from iron and steel production (EAF steel) from 2002 onwards includes fuel consumption, raw material consumption and carbon content of raw materials</p> <p>It was not clear to the ERT which types of fuels were considered in the CO<sub>2</sub> emission estimates. In addition, the ERT noted that the allocation of CO<sub>2</sub> emissions from all fuel consumption used in EAF steel production in category 2.C.1 (iron and steel production) could lead to the overestimation of emissions and is not in line with the 2006 IPCC Guidelines</p> <p>During the review Portugal provided more information regarding the types of fuels used (natural gas, gas oil, fuel oil and propane consumption) in the estimation from 2002 onwards and informed the ERT that the related emissions were reported under the energy sector, in category 1.A.2.a (iron and steel)</p> <p>The ERT commends the Party for the explanation provided and recommends that Portugal include this information on the type of fuels used for CO<sub>2</sub> emission estimates and how CO<sub>2</sub> emissions are allocated (from 2002 onwards) between categories 2.C.1 and 1.A.2.a</p>	Yes. Transparency*
I.35	2.C.1 Iron and steel production – CO <sub>2</sub>	<p>The ERT noted that Portugal did not report emissions from the use of limestone in category 2.C.1 (iron and steel production). According to the 2006 IPCC Guidelines, CO<sub>2</sub> emissions from limestone and dolomite use (other than the quantities used for lime production) in iron and steel production must be estimated and reported under category 2.C.1. Limestone and dolomite are mainly used in BOF steel production and this flow type was closed in 2001 in Portugal. However, the ERT is of the view that not estimating these emissions could lead to an underestimation of emissions for 1990–2001</p> <p>The ERT recommends that Portugal estimate emissions from the use of limestone and dolomite and report these estimates under category 2.C.1</p>	Yes. Completeness*
I.36	2.D.3 Other (non-energy products from fuels and solvent use) – CO <sub>2</sub>	<p>The ERT noted that Portugal did not report in the NIR emissions from urea used as catalyst in category 2.D.3 (other)</p> <p>During the review, Portugal informed the ERT that non-combustive CO<sub>2</sub> emissions from urea-based catalytic converters were reported under category 1.A.3.b (road transportation), and estimated using the COPERT IV model, and that they represent 0.00069% of the total CO<sub>2</sub> emissions from road transportation. The Party also informed the ERT that it plans to allocate the emissions from urea-based catalytic converters to category 2.D.3 in the next submission</p> <p>The ERT recommends that Portugal report emissions from urea used as catalyst under category 2.D.3 (other) (in accordance with the 2006 IPCC Guidelines), and explain this reallocation in its</p>	Yes. Comparability*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		NIR	
I.37	2.F. Product uses as substitutes for ozone-depleting substances – HFCs, PFCs and SF <sub>6</sub>	<p>Portugal estimated emissions from categories 2.F.1 (refrigeration and air conditioning), 2.F.2 (foam blowing agents), 2.F.3 (fire protection) and 2.F.4.a (aerosols- metered dose inhalers) using the methodologies provided in the 2000 IPCC good practice guidance</p> <p>During the review, Portugal informed the ERT that a thorough internal review of the F-gases category is taking place in Portugal and that the methodologies recommended by the 2006 IPCC Guidelines will be used in the next submission</p> <p>The explanation provided by the Party shows a general accuracy problem that, depending on the direction of recalculations, could indicate a potential overestimation of emissions for the base year for F-gases (1995) and a potential underestimation for 2013 and 2014. For these reasons, the ERT included this issue in the list of potential problems and further issues raised by the ERT during the review</p> <p>In response, Portugal provided revised estimates on 3 November 2016 for all 2.F categories using the methodologies and EFs provided in the 2006 IPCC Guidelines. The ERT agreed with the estimates provided for the F-gases categories, except for the categories below, for which follow-up was required:</p> <ol style="list-style-type: none"> <li data-bbox="663 863 1727 1070">(1) For category 2.F.1.a, the AD (for supermarkets) were obtained from the Portuguese Association of Distribution Companies (APED) for the period 1990–2010, and for the period 2011–2014 the same values as for 2010 were assumed. The ERT considered that by assuming the same number of new supermarkets verified in 2010 for the period 2011–2014, Portugal introduced a bias in the estimation of the AD. Portugal revised the estimates for the AD based on the average AD for the period 2001–2010, the average GDP for the same period, and the GDP trend from 2011 onwards</li> <li data-bbox="663 1094 1727 1302">(2) For category 2.F.1.b (refrigeration), the AD provided by Portugal for the period 2008–2014 were obtained from data estimated based on GDP and the total of assembled equipment for 2007. The ERT considered that estimating the amount of equipment for the period 2008–2014 based on one year only (2007) would introduce a bias in the estimation of the AD. In response, Portugal assumed that the trend from 2004 onwards is based on the average number of equipment sold in the period 1990–2003, the average GDP for the same period, and the GDP trend from 2004 onwards</li> <li data-bbox="663 1326 1727 1414">(3) For category 2.F.1.d (transport refrigeration), Portugal provided the AD and emission estimates for the period 1996–2014, but no information on the AD and emission estimates for the period 1990–1995. Portugal explained that according to information from national</li> </ol>	Yes. Transparency*



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		producers, the use of HFCs in this type of equipment started in 1996	
		(4) For category 2.F.2 (foam blowing agents), Portugal provided the AD per type of foam and gas for the period 1990–2014 and stated that for 2011 onwards the data were estimated based on the GDP trend and the foam production values for 2010. The ERT considered that by estimating the AD for the period 2011–2014 based on one year only (2010) a bias would be introduced in the estimation of the AD. Portugal provided new estimated AD for 2011 onwards based on the average of the AD for the period 2008–2010, the average GDP for the same period, and the GDP trend for 2011 onwards	
		Portugal provided the new revised estimates on 22 December 2016. The revised estimates for all F-gases increased the emissions from this category by 4.77 kt CO <sub>2</sub> eq for 1995 (15.5%) and by 659.3 kt CO <sub>2</sub> eq for 2013 (38.0%). The ERT considers that all the potential underestimations of emissions were resolved	
		The ERT agrees with the estimation method presented by the Party and recommends that Portugal update its NIR by explaining how the estimates for categories 2.F.1, 2.F.2, 2.F.3 and 2.F.4 were calculated, including detailed information on the AD and EFs used and their sources. In addition, for category 2.F.1.a, the ERT encourages Portugal to make efforts to obtain the AD from APED for the period 2011–2013 and present the new emission estimates in the next submission	
<b>Agriculture</b>			
A.7	3.A Enteric fermentation – CH <sub>4</sub>	Portugal has made efforts and implemented the recommendations as required by the previous review report (see A.1 in table 3). However, the ERT noted that some inconsistencies and errors in the NIR still remain, for example: (1) an error in the unit indicated for milk production (which should be reported as 8 548 kg/head/year and not 8 548 kg CH <sub>4</sub> /year); (2) the same error was made with the unit of default value for milk production (which should be reported as 8 400 kg/head/year and not 8 400 kg CH <sub>4</sub> /year; and (3) the footnote below tables 5.15 and 5.16 is inconsistent with the equation described in the text (on pp.5-14 and 5-18) and Portugal informed the ERT that it would correct this in the next submission: the equation Cweight 0.75/Cweight 0 should be Cweight 0.75/Cweight 0.75	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
		The ERT recommends that Portugal improve its QA/QC procedures and correct the errors in the unit indicated for milk production, and in the footnote to tables 5.15 and 5.16 of the NIR	
A.8	3.A Enteric fermentation – CH <sub>4</sub>	Portugal reported in sections 5.3.3.1.2 (non-dairy cattle) and 5.3.3.1.3 (sheep and goats) of the NIR that a model was developed to estimate population weights for non-dairy cattle, sheep and goats. This model was developed because the data available (from 1998), cover only three ages (birth, seven months and adults), and include only 20% of the population at that time. The model is based	Yes. Accuracy*

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		<p>on data provided by Jarrige (1988)<sup>d</sup> and was used to extrapolate data for the ages in between, based on European data. The results can be seen in figures 5.7 (growth model for cattle) and 5.9 (average carcass weight at slaughtering) of the NIR</p> <p>Considering that the existing data are from a single year (1998) and that the model used to extrapolate the data are from 1988, the ERT is of the view that the data may not account for variations that occurred over time</p> <p>Therefore, the ERT recommends that Portugal promote a new data gathering process to update the data set used as a basis for the determination of the growth profile of the livestock (weight at different ages until slaughter), and report in its next NIR any plan or implementation status related to this update. The use of a new data set may dismiss the need for the use of the Jarrige model from 1988</p>	
A.9	3.A Enteric fermentation – CH <sub>4</sub>	<p>In the NIR (p.5-14, section 5.3.3.1.2 – non-dairy cattle), Portugal reported an equation used to calculate the non-dairy cattle parameters as a function of the yearly average carcass weight to estimate the EF (kg CH<sub>4</sub>/head/year). The estimates are from 1998 and the values of the parameters used are corrected by an exponential function of the carcass weight variation. The same equation was also used for sheep and goats (p.5-18, section 5.3.3.1.3). However, no reference was provided for the equation and no QA/QC procedures to verify its validity and adequacy were discussed in the NIR</p> <p>In response to a question raised by the ERT during the review, the Party explained that the equation used follows the approach described in note 1 to table 10.10 of the 2006 IPCC Guidelines to scale the EFs for animals of different species but with a similar digestive system using the ratio of weights of the animals. Portugal used the same equation of the ratio of weights (carcass) for the base year (1990), and for the other years, the Party raised to the 0.75 power to estimate the CH<sub>4</sub> EFs for the same animal subclass for different years</p> <p>The ERT commends Portugal for the explanation and clarification provided and recommends that the Party further clarify the rationale and references for the equation referred to on pages 5-14 and 5-18 in its next NIR</p>	Yes. Transparency*
A.10	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that on page 5-35 of the NIR, two climatic zones are selected for the continental land; however, no reference is made to the climatic zones adopted for the islands that are part of the country. Following a request made by the ERT, Portugal explained that the islands are included in the temperate zone and that clarification will be included in the next NIR</p> <p>The ERT recommends that the Party include information on which climatic zones are adopted for</p>	Yes. Transparency*

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A.11	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O	<p>islands that are part of the country in its next submission</p> <p>The ERT noted that Portugal allocated 80% of swine manure to anaerobic lagoon MMS for 1990 and used an MCF of 73% for cool and 76% for temperate climatic regions. During the review, the ERT raised a question regarding the choice of the selected MMS for swine manure, noting the likelihood that anaerobic lagoons might not properly represent the actual and historical technology in Portugal</p> <p>In response, Portugal explained that during an EU review earlier in 2016, it was agreed that the default MCFs used for uncovered anaerobic lagoon systems for swine manure were conservative and lead to an overestimation of CH<sub>4</sub> emissions from this animal category. Portugal also explained that it was agreed that the estimates of CH<sub>4</sub> emissions would be revised using MCFs for liquid systems of 25% for cool and 32% for temperate climatic regions. Furthermore, Portugal stated that this issue is under discussion in a working group of the Ministry of Agriculture of Portugal</p> <p>The ERT considered that the current estimates provided by Portugal for this category represented an overestimation of the base-year emissions and included this issue in the list of potential problems and further questions raised by the ERT during the review</p> <p>In response, Portugal provided revised estimates of CH<sub>4</sub> emissions from manure management for swine. The response provides appropriate values for the EFs adopted in the calculations of CH<sub>4</sub> emissions from wastewater treatment systems. Additionally, after submitting its response, Portugal continued to work on the MCF values and further detailed the data and the determination of the MCF values by incorporating a second technology that also exists in the country</p> <p>Two different types of manure management liquid systems were included:</p> <ol style="list-style-type: none"> <li>(1) Liquid systems with natural crust: prior to the review, these were reported as “anaerobic lagoons”</li> <li>(2) Tanks (short retention pits): no changes were made following the review</li> </ol> <p>Both of the above liquid systems have different MCF default values: 25 (cool)/32 (temp) for liquid systems with natural crust and 3 (cool)/3 (temp) for tanks (short retention pits). The MCF values reported in CRF table 3.B(a)s2 in column F (liquid system) result from the weighted average of the two types of liquid systems mentioned above (weighted by the fraction of manure diverted to each one)</p> <p>The annual variation is related to the share of manure managed in each of the two systems every year. The revised estimates reduced CH<sub>4</sub> emissions from swine manure from 47.34 kt CH<sub>4</sub> to</p>	Yes. Transparency*

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A.12	3.D.a.2 Organic N fertilizers – N <sub>2</sub> O	<p>18.48 kt CH<sub>4</sub> for 1990</p> <p>The ERT considers that the potential overestimation of emissions has been resolved and recommends that Portugal update the description of the calculations in its NIR</p> <p>The ERT noted that the chapter of the NIR on waste management describes the production of compost and the calculation of production emissions (chapter 7, figures 7.2 and 7.3 and table 7.1). However, the product use and emissions from use are not described in the calculation of emissions from organic fertilizers (in the agriculture sector)</p> <p>According to Portugal, the compost from municipal solid waste (MSW) has been recognized as a fertilizer since June 2015 only (Decree Law 103/2015). The decree establishes quality standards and control measures, including the monitoring of the compost applied to agricultural soils</p> <p>The ERT commends Portugal for the explanation provided and recommends that the Party account for the use of compost as fertilizer and the associated emissions in the next submission given the implementation of the regulatory framework that allows for its use</p>	Yes. Completeness*
A.13	3.D.b.2 Nitrogen leaching and run-off – N <sub>2</sub> O	<p>The ERT noted that the estimate of leaching/run-off losses is being applied to the entire territory of Portugal and not only to the areas where the soil water holding capacity is exceeded. Water holding capacity is a new addition from the 2006 IPCC Guidelines</p> <p>During the review, the Party explained that it considers that the water holding capacity of soils is exceeded for the entire national territory, as a result of rainfall during the rainy season, when autumn/winter crops are growing, and as a result of irrigation practices associated with spring/summer crops. Portugal has many dams and water reservoirs, which, under normal weather conditions, are recharged every year as a result of run-off from rainfall in the watersheds. The water accumulated during the rainy season has two types of use: for energy production; and for irrigation of spring/summer crops (irrigated crops). The dams and water reservoirs are scattered throughout the country</p> <p>The ERT commends Portugal for the explanation provided, but finds that the Party has adopted a very conservative approach to determining N<sub>2</sub>O emissions from leaching considering that the whole territory is subject to exceedance of the water holding capacity. Therefore, the ERT recommends that Portugal make further efforts to determine the percentage of the territory (soils) on which the water holding capacity is exceeded during the rainy season and revise its N<sub>2</sub>O emission estimates</p>	Yes. Accuracy*

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L.15	4. General (LULUCF) – Activity data	<p>In response to a previous recommendation (see L.6 in table 3) Portugal provided information on the status of the latest NFI (NFI6) report (which is delayed and not yet ready to be used as source of data). The NIR also states (p.6-27, table 6.17, note (1)) that the NFI6 was conducted in 2010 and the Party is planning to use the results of this inventory to improve the quality of different forest parameters, including living biomass, as soon as the NFI6 is finalized</p> <p>The ERT noted that although the recommendation in L.1 and L.5 in table 3 were implemented and the methodology for the assessment of the MAI and biomass volume are provided in the NIR (section 6.1.3) as soon as the NFI6 is finalized, Portugal should use it to update the AD in accordance with the 2006 IPCC Guidelines</p> <p>Therefore, the ERT recommends that Portugal revise the MAI and other relevant AD (as for example the country-specific definition of important variables such as MAI and wood volume, the methodology on how the MAI is defined, as mentioned in L.1 and L.5); and provide all methodological updates (as mentioned in L.6), as soon as the NFI6 is officially published and in accordance with the 2006 IPCC Guidelines</p>	Yes. Accuracy*
L.16	4.A Forest land – activity data	<p>Tables 6.11 and 6.12 include information on volumes per hectare from the NFIs for 1995 and 2005. For most species, there are minor changes between the two years, but for some (i.e. other broadleaves, pinus pinea and other coniferous) there are large differences</p> <p>In response to a question raised by the ERT during the review regarding the reason for these changes and why no corresponding change is visible between NIR tables 6.13 and 6.14 (related to the MAI), the Party clarified that the larger differences in volume per hectare can be explained by the growth of the trees and also by the larger number of plots used in the later NFI that can be considered more accurate for the tree species classes that are less frequent in Portugal (e.g. other broadleaves, pinus pinea and other coniferous) and that the MAIs are not evaluated directly from the NFI data, but rather from reference values for each tree species under a standard silviculture model. Therefore, differences in the growing stock do not have an impact on the MAI values used over the years</p> <p>The ERT found that the clarification provided by the Party was not satisfactory because the formula on page 6-22 of the NIR shows a direct relationship between the biomass volume and the MAI calculation</p> <p>The ERT recommends that Portugal provide more transparent information on the reasons for the large differences noted by the ERT in NIR tables 6.11 and 6.12 (information on volumes per hectare) and on the relationship between the biomass volume and the MAI calculation</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
Waste			
W.4	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>In the NIR (table 7.3, p.7-13), Portugal provided information on the composition of municipal waste disposed to SWDS and the DOC values applied. The ERT noted that the Party reported waste composition values for the early 1960s, 1970s and 1980s for all the fermentable fractions, except for non-food fermentable materials and wood (which were reported as 0.0)</p> <p>In response to a question raised by the ERT during the review, Portugal explained that the data on waste quantities and composition are scarce for the very early years of the time series, whereas for the later years the data include all waste fractions. The classification of categories in earlier studies is not exactly the same as for the years starting from the early 1990s, as the non-food fermentable materials and wood/straw fractions were not reported separately, but included under other categories, particularly under “food waste”</p> <p>The ERT commends the Party for the explanation provided and recommends that Portugal include this information in its next NIR, clarifying why the waste composition values for non-food fermentable materials and wood for the 1960s, 1970s and 1980s were zero and where they were included for DOC calculation purposes</p>	Yes. Transparency*
W.5	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>In the NIR (table 7.3, p.7-13), Portugal reported the DOC values used for the different municipal waste fractions disposed to SWDS. As described under W.4 above, the non-food fermentable materials and wood/straw fractions were not reported separately, but included under other categories, particularly under food waste for the early years of the time series (i.e. 1960s, 1970s and 1980s)</p> <p>The ERT noted that Portugal applied a DOC of 15 for food waste, although fractions of non-food fermentable materials (similar to garden and park waste) and wood waste are also included (i.e. fractions with a higher DOC content (garden and park: 20; wood: 43))</p> <p>The ERT recommends that Portugal either provide justification for not adapting the DOC values for “food waste”, by considering the waste included under this category with a higher DOC content (garden and park and wood) or provide the DOC values accordingly in the next submission</p>	Yes. Accuracy*
W.6	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>Portugal stated in the NIR that industrial waste refers only to the fermentable part of industrial waste. NIR table 7.4 (p.7-14) shows two groups with a different waste composition for the periods 1960–2003 and 2004–2014. It was unclear to the ERT how the equivalence among some of the categories was considered for maintaining the consistency of the estimates (e.g. regarding food waste). The ERT also noted that some of the DOC default values used are not in accordance with the 2006 IPCC Guidelines. In addition, it was unclear what the fraction “mixed and undifferentiated</p>	Yes. Accuracy*

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W.7	5.B. Biological treatment of solid waste – N <sub>2</sub> O and CH <sub>4</sub>	<p>materials” is composed of (in order to be able to evaluate the DOC values) and why “household and similar wastes” are included in table 7.4 on industrial organic waste composition</p> <p>In response to a question raised by the ERT during the review, the Party explained that the aggregation of categories and data considered up to 2003 refers to a study/analysis that was conducted several years ago. For that study/analysis, the DOC default values considered for each category refer to the Revised 1996 IPCC Guidelines (i.e. table 6-3, p.6.9)</p> <p>The Party also explained that some DOC values do not refer directly to the IPCC defaults but result from the consideration of some assumptions, as follows:</p> <ol style="list-style-type: none"> <li>(1) Sludge from natural origin or common sludge: DOC value of 0.14; this figure was obtained considering 20% of solids in sludge and 70% of carbon in organic matter</li> <li>(2) Household and similar wastes: the MSW composition data were partly based on table 2.3 of the 2006 IPCC Guidelines for Western Europe, and the DOC values were from table 6-3 of the Revised 1996 IPCC Guidelines</li> <li>(3) Mixed and undifferentiated materials: the average of the DOC default values for paper and textiles, garden waste, park waste or other non-food organic putrescibles, food waste, and wood or straw</li> </ol> <p>The ERT recommends that Portugal clarify and provide detailed information on the consistency of data between the waste groups as reported for the time series 1960–2003 and the waste groups as reported for 2004–2014 (i.e. how consistency is ensured for the different waste groups reported for the periods 1960–2003 and 2008–2014)</p> <p>Moreover, the ERT recommends that Portugal include information on the composition of “mixed and undifferentiated materials” and explain why household and similar wastes are included in table 7.4 of the NIR (although they are already considered as municipal waste – as reported in table 7.3 of the NIR)</p> <p>Furthermore, the ERT recommends that Portugal consistently apply the default DOC values from the 2006 IPCC Guidelines (also for historical depositions) or apply well-justified country-specific parameters</p> <p>The ERT noted that the CH<sub>4</sub> and N<sub>2</sub>O EFs for composting and anaerobic digestion at biogas facilities are not in line with the 2015 corrigenda of the 2006 IPCC Guidelines.<sup>e</sup> In the corrigenda, the N<sub>2</sub>O EF for composting was changed from 0.3 to 0.24 g N<sub>2</sub>O/kg waste treated (wet weight basis) and the CH<sub>4</sub> EF for anaerobic digestion was changed from 1 to 0.8 g CH<sub>4</sub>/kg waste treated (wet weight basis). However, this was not reflected in the 2016 inventory submission of Portugal (in table</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		<p>7.8)</p> <p>In response to a question raised by the ERT during the review requesting that Portugal clarify this issue and inform the ERT about its plans to adapt the EFs to the new IPCC default EFs, Portugal confirmed that the EFs will be updated and the estimates revised for the next submission</p> <p>The ERT considered that not applying the values of the corrigenda is an overestimation of emissions, but noted that the value is below the threshold for adjustment. Therefore, the ERT invited Portugal to revise its estimates when responding to the list of potential problems and further questions raised by the ERT during the review of the other sectors of the inventory</p> <p>In response, Portugal revised its N<sub>2</sub>O and CH<sub>4</sub> estimates and applied the values of the corrigenda (IPCC TFI, 31 July 2015). The revised emissions reduced emissions from 9.5 to 8.6 kt CO<sub>2</sub>eq (-0.9%) in 1990</p> <p>The ERT agreed with the revised estimates and recommends that the Party update the next NIR explaining the methodology and values applied accordingly</p>	
KP-LULUCF			
KL.4	General (KP-LULUCF) – Activity data	<p>The ERT noted that some cells or columns in the CRF tables were left blank, as indicated below:</p> <ul style="list-style-type: none"> <li>(a) CRF table NIR 2 – the ERT noted that Portugal reported “NO” to indicate that revegetation and wetlands are not elected activities . However, the ERT is of a view that the correct notation key would be “NA”</li> <li>(b) CRF table NIR 2.1 – the ERT noted that no values or notation keys were reported for “Additional information: area of natural forests converted to planted forests”. And in chapter 11.4.4 of the NIR, Portugal reported that there are no forests converted to planted forests in the country. The ERT is of the view that the notation key “NO” should be reported</li> <li>(c) CRF table NIR 3 – the ERT noted that no values or notation keys were reported. . However, the Party provided in NIR table 1.4 (section 1.5) all calculations related to the key categories for LULUCF activities, including activities under the Kyoto Protocol. The ERT is of a view that the Party has enough data to complete this CRF table</li> <li>(d) CRF table 4(KP-I)A.2 – the ERT noted that the column “Net carbon stock change in HWP” was left blank. The ERT is of the view that the notation key “NO” should have been reported, showing that deforestation did not occur in 2014, as mentioned in CRF table 4(KP-I)C</li> </ul> <p>The ERT recommends that Portugal complete CRF tables NIR 2, NIR 2.1 and 4(KP-I)A.2 with the relevant notation key(s) and CRF table NIR 3 with the relevant data as reported in NIR table 1.4</p>	Yes. Comparability*



ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		(section 1.5)	
KL.5	General (KP-LULUCF) – CO <sub>2</sub>	<p>Portugal reported in the NIR (section 11.3.2) that forest fires are the main natural disturbance for Portugal. However, the ERT noted that the Party did not provide information on which types of natural disturbances were included in the background level estimates</p> <p>Following a request made by the ERT, Portugal confirmed that only fire emissions were included in the background level estimates of natural disturbances. Although that information is not explicitly referred to in the text, NIR table 11.4 (section 11.4.5) identifies in the last row “Forest fire emissions (natural disturbances background level)”. The Party confirmed that the information could be made clearer in the text of future NIRs</p> <p>The ERT recommends that Portugal make clear in the text of the NIR the information on which types of natural disturbances were included in the background level estimates</p>	Yes. Transparency*
KL.6	General (KP-LULUCF) – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that table 11.2 of the NIR (section 11.4.2) related to the “summary of reported emissions and removals under the KP for cropland management and grassland management” was blank or with “NA”</p> <p>The ERT recommends Portugal to report relevant figures in NIR table 11.2 or provide an explanation for not doing so in its next NIR</p>	Yes. Transparency*
KL.7	Deforestation Activity data	<p>In section 11.3.2 of the NIR, Portugal elaborated on how deforestation is distinguished from temporarily unstocked areas. Portugal referred to the five-year rule, but it is not clear how that rule is implemented when the time between land-use maps is much longer than five years</p> <p>During the review, the Party clarified that changes observed by comparing the maps with time intervals greater than five years are all treated as having already occurred (no temporarily unstocked areas are identified). Portugal noted that the five-year period was used in the production of each of the maps, by comparing the current land-use (from the aerial photography being used) with auxiliary information (e.g. annual fire maps). For example, an area which was a forest area in year X, which has no trees in year Y, but suffered a fire less than five years ago will be classified as forest in year Y. Future maps, when elaborated, will confirm if the trees “are back”, in which case the classification of forest is maintained, or if the trees continue to be missing, in which case the deforestation is confirmed and the map for year Y is corrected. Naturally, this leads to recalculations of the time series, when a new map becomes available</p> <p>The ERT commends Portugal for the explanation provided and recommends that the Party include in its next NIR information clarifying how the five-year rule is implemented when the time between</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
		land-use maps is much longer than five years	
KL.8	Forest management Article 3.4 activities – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The forest management cap is calculated as 3.5% of the base year emissions, multiplied by the duration of the commitment period (eight years). Portugal has not reported its forest management cap in the CRF table “accounting”. However in its initial report to facilitate the calculation of the assigned amount (FCCC/IRR/2016/PRT) Portugal reported its forest management cap as 16 954 564 t CO<sub>2</sub> eq</p> <p>The ERT noted that this value was not calculated in relation to the base-year as indicated in decision 2/CMP.8, annex I, paragraph 1(b) (i.e. 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, 1995 for HFCs, PFCs and SF<sub>6</sub> and 2000 for NF<sub>3</sub> in the case of Portugal). Based on the revised estimates submitted by Portugal in response to the list of potential problems (v.5 of the CRF tables), the ERT calculated the base-year as equal to 65 028 094 t CO<sub>2</sub> eq, including in this value indirect emissions of CO<sub>2</sub> (153 812 t CO<sub>2</sub> eq) and deforestation (4 276 759 t CO<sub>2</sub> eq) in 1990. The ERT also calculated the forest management cap (excluding the value of deforestation in the base year) as 2 126.297 kt CO<sub>2</sub> eq that multiplied by eight totals 17 010.374 kt CO<sub>2</sub> eq</p> <p>The ERT recommends that Portugal report the correct value for the forest management cap in CRF table “accounting”. In addition the ERT encourages Portugal to take note of the corrected base year emissions in accordance with decision 2/CMP.8</p>	Yes. Accuracy*
KL.9	Forest management CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The FMRL for Portugal in accordance with appendix 1 to the annex to decision 2/CMP.7 is 6 830 kt CO<sub>2</sub> eq. However, the ERT noted that in CRF table “accounting” the Party reported as FMRL the value of –6 827 kt CO<sub>2</sub> eq</p> <p>The ERT recommends that Portugal report –6 830.00 kt CO<sub>2</sub> eq as its FMRL in the CRF table “accounting” in accordance with decision 2/CMP.7</p>	Yes. Comparability*
KL.10	Forest management Activity data	<p>Figure 6.9 of the NIR presents a summary of the land areas reported under the Kyoto Protocol for 1990, 2013 and 2014. Comparing with figure 7.8 of the 2014 NIR, the ERT is of the view that figure 6.9 of the 2016 NIR is unclear and inconsistent as it does not show that the total territory of Portugal, including the autonomous regions of Azores and Madeira, is constant in 1990 and all subsequent inventory years</p> <p>During the review, Portugal explained that the areas shown in figure 6.9 are those that are relevant for Kyoto Protocol accounting and, in accordance with the Kyoto Protocol accounting rules (decision 2/CMP.7), the comparison with 1990 is only relevant for those activities that are accounted for using 1990 as a base year (i.e. cropland management and grassland management)</p> <p>The ERT found that the response provided by Portugal was not satisfactory. A similar graph in the</p>	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>b</sup> and/or a problem <sup>c</sup> ? If yes, classify by type
KL.11	Forest management CO <sub>2</sub>	<p>2014 NIR (figure 7.8) is more transparent and supports the concept that, overall, territories should be the same over time if territorial changes do not occur, which is not the case for Portugal</p> <p>The ERT encourages Portugal to maintain the format of figure 6.9 as it is in the 2014 NIR (figure 7.9) in order to make clearer the concept of the total territory of Portugal</p> <p>In tables 11.3 and 11.4, Portugal showed the impact of the recalculations of the land area and the technical correction of the FMRL. The ERT noted that losses in above-ground biomass presented the higher variation, from 3 747.3 Gg C (the original value) to 4 976.0 Gg C (the recalculated value). The ERT requested that the Party explain the reasons for the large difference in losses in above-ground biomass. Portugal clarified that the recalculation occurred following recommendations from the ERT made in the review of the 2014 submission, after which a number of changes to the calculation of losses from living biomass were introduced and implemented in the resubmission of the 2014 submission</p> <p>The ERT is of the opinion that the response provided by Portugal does not cover the purpose of the question to identify the drivers of/reasons for the high losses in above-ground biomass and recommends that the Party review this question and provide more transparent information in its next NIR</p>	Yes. Transparency*

*Abbreviations:* AD = activity data, , CRF = common reporting format, DOC = degradable organic carbon, EAF = electric arc furnace, EF = emission factor, ERT = expert review team, EU = European Union, EU ETS = European Union Emissions Trading System, F-gases = fluorinated gases, FMRL = forest management reference level, GDP = gross domestic product, HWP = harvested wood products, IAPI = Inquerito anual da producao industrial, IE = included elsewhere, IEF = implied emission factor, INE = Instituto Nacional de estatistica, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol Supplement = *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*, LKD = lime kiln dust, LNG = liquefied natural gas, LPG = liquefied petroleum gas, LULUCF = land use, land-use change and forestry, MAI = mean annual increment, MCF = methane conversion factor, MMS = manure management system, NA = not applicable, NE = not estimated, NFI = national forest inventory, NIR = national inventory report, NMVOC = non-methane volatile organic compound, NO = not occurring, QA/QC = quality assurance/quality control, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, SWDS = solid waste disposal site, , TFI = task force on national greenhouse gas inventories, TFT = thin film transistor, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, Wetlands Supplement = *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

<sup>a</sup> The review of the 2015 GHG annual submission is being held in conjunction with the review of the 2016 annual submission, in accordance with decision 10/CMP.11, paragraph 1. The ERT has reviewed both the 2015 and the 2016 inventory submission, and in accordance with the conclusions from the 13<sup>th</sup> meeting of greenhouse gas inventory lead reviewers (para. 9) has started with the review of the 2016 submission. This table includes all findings that are relevant for both

8 the 2015 and the 2016 annual submission (i.e. this table excludes findings that, although they may have been relevant for the 2015 annual submission, had already been resolved in the 2016 annual submission).

<sup>b</sup> Recommendations are related to issues as defined in decision 13/CP.20, annex, paragraph 81, or problems as identified in decision 22/CMP.1, annex, paragraph 69, identified by the ERT during the review. Encouragements are made to the Party to address all findings not related to issues.

<sup>c</sup> An asterisk is included next to each issue type that is also a problem, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

<sup>d</sup> <<https://www.worldsteel.org/steel-by-topic/statistics/steel-statistical-yearbook-.html>>.

<sup>e</sup> Jarrige R. 1988. Alimentation des Bovins, Ovins et Caprins. Paris: INRA.

<sup>f</sup> IPCC TFI, 31 July 2015 available at <<http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>>.

## **VI. Application of adjustments**

11. The ERT has not identified the need to apply any adjustments to the 2015 annual submission of Portugal.

## **VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol**

12. Portugal has elected commitment period accounting and therefore the issuance and cancellation of units for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are not applicable for the 2015 review.

## **VIII. Question of implementation**

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

## Annex I

### Overview of greenhouse gas emissions and removals for Portugal for submission year 2015 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

1. Tables 6–9 provide an overview of total greenhouse gas emissions and removals, as submitted by Portugal.

Table 6

#### Total greenhouse gas emissions for Portugal, base year<sup>a</sup>– 2013<sup>b</sup>

(kt CO<sub>2</sub> eq)

	Total GHG emissions excluding indirect CO <sub>2</sub> emissions		Total GHG emissions including indirect CO <sub>2</sub> emissions <sup>c</sup>		Land-use change (Article 3.7 bis as contained in the Doha Amendment) <sup>d</sup>	KP-LULUCF activities (Article 3.3 of the Kyoto Protocol) <sup>e</sup>	KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)	
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF			CM, GM, RV, WDR	FM
FMRL								–6 830.00
Base year	62 345.68	60 597.52	62 499.49	60 751.33	4 276.76		5 172.29	
1990	62 296.33	60 548.17	62 450.14	60 701.98				
1995	66 673.39	71 230.74	66 839.70	71 397.05				
2000	77 955.17	83 959.49	78 126.74	84 131.07				
2010	59 512.68	70 917.31	59 644.26	71 048.89				
2011	57 870.71	69 395.03	57 991.11	69 515.43				
2012	58 233.59	67 324.57	58 356.17	67 447.14				
2013	57 051.92	65 536.91	57 184.71	65 669.70		–2 474.78	424.49	–6 274.61

Abbreviations: CM = cropland management, FM = forest management, FMRL = forest management reference level, GHG = greenhouse gas, GM = grazing land management, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, RV = revegetation, WDR = wetland drainage and rewetting.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, 1995 for HFCs, PFCs, SF<sub>6</sub> and 2000 for NF<sub>3</sub>. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported

<sup>b</sup> Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

<sup>c</sup> The Party has reported indirect CO<sub>2</sub> emissions in common reporting format table 6.

<sup>d</sup> The value reported in this column refers to 1990.

<sup>e</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

Table 7

**Greenhouse gas emissions by gas for Portugal, excluding land use, land-use change and forestry, 1990–2013<sup>a</sup>**(kt CO<sub>2</sub> eq)

	<i>CO<sub>2</sub><sup>b</sup></i>	<i>CH<sub>4</sub></i>	<i>N<sub>2</sub>O</i>	<i>HFCs</i>	<i>PFCs</i>	<i>Unspecified mix of HFCs and PFCs</i>	<i>SF<sub>6</sub></i>	<i>NF<sub>3</sub></i>
1990	46 112.85	10 599.48	3 989.65	NO, NA	NO, NA	NO, NA	NO, NA	NO
1995	55 329.27	11 863.02	4 155.41	35.42	NO	NO	13.93	NO
2000	66 783.14	12 639.44	4 409.53	281.22	1.13	NO	16.61	NO
2010	53 430.39	12 108.02	3 557.75	1 910.10	7.93	NO	34.69	NO
2011	51 984.80	12 123.97	3 289.28	2 078.09	9.05	NO	30.24	NO
2012	50 100.22	11 798.73	3 288.15	2 216.48	10.18	NO	33.38	NO
2013	48 340.13	11 560.47	3 340.19	2 382.56	11.36	NO	35.00	NO
<b>Per cent change 1990–2013</b>	<b>4.8</b>	<b>9.1</b>	<b>-16.3</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

*Abbreviations:* NA = not applicable, NO = not occurring

<sup>a</sup> Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

<sup>b</sup> CO<sub>2</sub> emissions include indirect CO<sub>2</sub> emissions reported in common reporting format table 6.

Table 8  
**Greenhouse gas emissions by sector for Portugal, 1990–2013<sup>a, b</sup>**  
 (kt CO<sub>2</sub>eq)

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
1990	41 610.52	6 254.57	6 806.45	1 748.15	6 030.44	NO
1995	50 728.97	6 542.99	6 954.30	-4 557.35	7 170.78	NO
2000	61 106.19	7 960.82	7 419.53	-6 004.32	7 644.54	NO
2010	49 197.32	7 833.32	6 442.76	-11 404.62	7 575.48	NO
2011	48 324.68	6 999.55	6 389.37	-11 524.32	7 801.84	NO
2012	46 807.05	6 717.08	6 429.93	-9 090.98	7 493.09	NO
2013	44 716.71	7 172.41	6 452.19	-8 484.99	7 328.39	NO
<b>Per cent change 1990–2013</b>	<b>7.5</b>	<b>14.7</b>	<b>-5.2</b>	<b>-585.4</b>	<b>21.5</b>	<b>NA</b>

*Abbreviations:* IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

<sup>a</sup> Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

<sup>b</sup> CO<sub>2</sub> emissions include indirect CO<sub>2</sub> emissions reported in common reporting format table 6.



Table 9

**Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year<sup>a, b</sup>–2013, for Portugal**

(kt CO<sub>2</sub> eq)

	<i>Article 3.3 of the Kyoto Protocol</i>			<i>Forest management and elected Article 3.4 activities of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>Afforestation and reforestation</i>	<i>Deforestation</i>	<i>Forest management</i>	<i>Cropland management</i>	<i>Grazing land management</i>	<i>Revegetation</i>	<i>Wetland drainage and rewetting</i>
FMRL				-6 830.00				
Technical correction				3 433.80				
Base year	4 276.76				3 620.92	1 551.37	NA	NA
2013		-4 742.14	2 267.35	-6 274.61	356.92	67.57	NA	NA
<b>Per cent change 1990–2013</b>					<b>-90.1</b>	<b>-95.6</b>	NA	NA

*Abbreviations:* FMRL = forest management reference level, NA = not applicable.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, 1995 for HFCs, PFCs, SF<sub>6</sub> and 2000 for NF<sub>3</sub>. The base year for cropland management, grazing land management, revegetation and wetland drainage and rewetting under Article 3, paragraph 4, of the Kyoto Protocol is 1990 for Portugal. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

<sup>b</sup> Values in this table include emissions on lands subject to natural disturbances, if applicable.

<sup>c</sup> The value reported in this column refers to 1990.

2. Table 10 provides an overview of relevant key data for Portugal's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10

**Key relevant data for Portugal under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**

<i>Key parameters</i>	<i>Values</i>
Periodicity of accounting	(a) Afforestation/reforestation: commitment period accounting (b) Deforestation: commitment period accounting (c) Forest management: commitment period accounting (d) Cropland management: commitment period accounting (e) Grazing land management: commitment period accounting (f) Revegetation: not elected (g) Wetland drainage and rewetting: not elected
Election of activities under Article 3, paragraph 4	Cropland management, grazing land management
Election of application of provisions for natural disturbances	Yes, for afforestation and reforestation and forest management
3.5 % of total base year GHG emissions, excluding LULUCF and including indirect CO <sub>2</sub> emissions	2 126.297 kt CO <sub>2</sub> eq (17 010.374 kt CO <sub>2</sub> eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. Afforestation and reforestation in 2013	NA
2. Deforestation in 2013	NA
3. Forest management in 2013	NA
4. Cropland management in 2013	NA
5. Grazing land management in 2013	NA
6. Revegetation in 2013	NA
7. Wetland drainage and rewetting in 2013	NA

*Abbreviations:* AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, RMU = removal unit.

## Annex II

### Information to be included in the compilation and accounting database

Table 11 includes the information to be included in the compilation and accounting database for Portugal. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable), as well as the final data to be included in the compilation and accounting database.

Table 11

#### Information to be included in the compilation and accounting database for 2013, including the commitment period reserve, for Portugal

(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>
<b>Commitment period reserve</b>	392 782 305	386 623 773		386 623 773
<b>Annex A emissions for 2013</b>				
CO <sub>2</sub> <sup>c</sup>	47 615 101	48 340 131		48 340 131
CH <sub>4</sub>	12 135 325	11 560 466		11 560 466
N <sub>2</sub> O	3 343 520	3 340 187		3 340 187
HFCs	1 734 595	2 382 561		2 382 561
PFCs	15	11 360		11 360
Unspecified mix of HFCs and PFCs	NO			NO
SF <sub>6</sub>	55 249	34 999		34 999
NF <sub>3</sub>	NO			NO
<b>Total Annex A sources</b>	<b>64 883 805</b>	<b>65 669 703</b>		<b>65 669 703</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013</b>				
3.3 Afforestation and reforestation	-4 742 135			-4 742 135
3.3 Deforestation	2 267 353			2 267 353
<b>Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013</b>				
3.4 Forest management for 2013	-6 274 610			-6 274 610
3.4 Cropland management for 2013	356 919			356 919
3.4 Cropland management for the base year	3 620 922			3 620 922
3.4 Grazing land management for 2013	67 570			67 570
3.4 Grazing land management for the base year	1 551 370			1 551 370

*Abbreviations:* Annex A sources = sources included in Annex A to the Kyoto Protocol, NO = not occurring.

<sup>a</sup> "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> CO<sub>2</sub> emissions include indirect CO<sub>2</sub> emissions reported in common reporting format table 6.

## Annex III

### Additional information to support findings in table 2

#### A. Missing categories that may affect completeness

1. The categories for which methods are included in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) were reported as “NE” (not estimated) or for which the expert review team otherwise determined that there may be an issue with the completeness of reporting in the Party’s inventory are the following:

- (a) CO<sub>2</sub> emissions from oil transport under category 1.B.2.a.3 (see E.44 in table 5);
- (b) CO<sub>2</sub> emissions from rock wool production under category 2.A.3 (see I.11 in table 5);
- (c) CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from ammonium sulphate production under category 2.B.10.b (see I.11 in table 5);
- (d) CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from explosives production under category 2.B.10.c (see I.11 in table 5);
- (e) CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from solvent use in plastic products manufacturing under category 2.B.10.d (see I.11 in table 5);
- (f) HFC, PFC, SF<sub>6</sub> and NF<sub>3</sub> emissions from integrated circuits or semiconductors under category 2.E.1 (see I.11 in table 5);
- (g) PFC, SF<sub>6</sub> and NF<sub>3</sub> emissions from TFT flat panel display under category 2.E.2 (see I.11 in table 5);
- (h) CO<sub>2</sub> emissions from lime production, category 2.A.2 (see I.14 in table 5);
- (i) CO<sub>2</sub> emissions from the use of limestone in category 2.C.1 (see I.35 in table 5);
- (j) N<sub>2</sub>O emissions from the production of compost under category 3.D.a.2 (see A.12 in table 5).

#### B. Recommendation for an in-country review: list of issues

2. The ERT has recommended that the next review for Portugal be conducted as an in-country review. In accordance with decision 13/CP.20, annex, paragraph 64, the ERT provides below a list of questions and issues to be addressed during this in-country review, as set out below.

3. Issue: adherence to the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”. The ERT has identified that for a number of categories, the implementation of the use of the 2006 IPCC Guidelines was not complete. In addition, the ERT considered that the NIR is generally lacking transparency, making it difficult to assess the accuracy of the inventory. According to the ERT the issues to be addressed that are included in tables 3 and 5 of this report are:

- (a) General: G.10, G.12;
- (b) Energy: E.22, E.23, E.24, E.26, E.28, E.29, E.33, E.34, E.36, E.41, E.42, E.45;
- (c) Industrial processes and product use: I.11, I.13, I.15, I.16, I.17, I.19, I.21, I.24, I.26, I.32, I.34, I.35, I.36;
- (d) Agriculture: A.8, A.9, A.10, A.13;

- (e) Land use, land-use change and forestry: L.15, L.16;
- (f) Waste: W.5, W.6;
- (g) Land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol: KL.6, KL.7, KL.11.

## Annex IV

### Documents and information used during the review

#### A. Reference documents

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at <<http://unfccc.int/resource/webdocs/agi/2015.pdf>>.

Annual status report for Portugal for 2015. Available at <<http://unfccc.int/resource/docs/2016/asr/prt.pdf>>.

FCCC/ARR/2014/PRT. Report on the individual review of the annual submission of Portugal submitted in 2014. Available at <<http://unfccc.int/resource/docs/2015/arr/prt.pdf>>.

FCCC/ARR/2013/PRT. Report of the individual review of the annual submission of Portugal submitted in 2013. Available at <<http://unfccc.int/resource/docs/2014/arr/prt.pdf>>.

FCCC/ARR/2012/PRT. Report of the individual review of the annual submission of Portugal submitted in 2012. Available at <<http://unfccc.int/resource/docs/2013/arr/prt.pdf>>.

FCCC/IRR/2016/PRT. Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Portugal. Available at <<http://unfccc.int/resource/docs/2016/irr/prt.pdf>>.

“Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks 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 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>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”. Annex I to decision 24/CP.19. Available at <<http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=4>>.

“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 the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”. Annex to decision 13/CP.20. Available at <<http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf#page=6>>.

“Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, part I: implications related to accounting and reporting and other related issues”. Decision 3/CMP.11. Available at <<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=5>>.

“Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, part II: implications related to review

and adjustments and other related issues”. Decision 4/CMP.11. Available at <<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=30>>.

Intergovernmental Panel on Climate Change. 2006. *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. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/kpsg>>.

Intergovernmental Panel on Climate Change. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html>>.

Standard independent assessment report, part 1, for Portugal for 2016. Available at <[http://unfccc.int/files/kyoto\\_protocol/registry\\_systems/independent\\_assessment\\_reports/application/pdf/siar\\_2016\\_prt\\_1\\_2.pdf](http://unfccc.int/files/kyoto_protocol/registry_systems/independent_assessment_reports/application/pdf/siar_2016_prt_1_2.pdf)>.

Standard independent assessment report, part 2, for Portugal for 2016. Available at <[http://unfccc.int/files/kyoto\\_protocol/registry\\_systems/independent\\_assessment\\_reports/application/pdf/siar\\_2016\\_prt\\_2\\_2.pdf](http://unfccc.int/files/kyoto_protocol/registry_systems/independent_assessment_reports/application/pdf/siar_2016_prt_2_2.pdf)>.

## **B. Additional information provided by the Party**

Responses to questions during the review were received from Ms. Teresa Costa Pereira (Climate Change department, Portuguese Environmental Agency), including additional material on the methodology and assumptions used.

## Annex V

### Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
Annex A sources	sources included in Annex A to the Kyoto Protocol
APED	Portuguese Association of Distribution Companies
ARR	annual review report
BF	blast furnace
BOF	basic oxygen furnace
C	carbon
CaCO <sub>3</sub>	calcium carbonate
CER	certified emission reduction
CH <sub>4</sub>	methane
CM	cropland management
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
EAF	electric arc furnace
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
ETS	Emissions Trading System
EU	European Union
EU ETS	European Union Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
F-gases	fluorinated gases
FM	forest management
FMRL	forest management reference level
FOD	first-order decay
g	gram
GDP	gross domestic product
GHG	greenhouse gas
GJ	gigajoule (1 GJ = 10 <sup>9</sup> joule)
GM	grazing land management
HFCs	hydrofluorocarbons
HWP	harvested wood products
IAIT	annual survey of manufacturing industries
IAPI	Inquerito anual da producao industrial
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IFA	international Fertilizer Industry Association
INE	Instituto Nacional de estatistica
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KC	key category
KCA	key category analysis



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kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
LKD	lime kiln dust
LNG	liquefied natural gas
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
m <sup>3</sup>	cubic metre
MAI	mean annual increment
MCF	methane conversion factor
MJ	megajoule (1 MJ = 10 <sup>6</sup> joule)
MMS	manure management system
MSW	municipal solid waste
N	nitrogen
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
NF <sub>3</sub>	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
NO <sub>x</sub>	nitrogen oxides
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10 <sup>15</sup> joule)
PRTR	Pollutant Release and Transfer Register
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF <sub>6</sub>	sulphur hexafluoride
SIAR	standard independent assessment report
SNIERPA	National System for the Estimation of Emissions by Sources and Removals by Sinks of Air Pollutants
SO <sub>x</sub>	sulphur oxides
SWDS	solid waste disposal site
t	tonne
TFI	task force on national greenhouse gas inventories
TFT	thin film transistor
toe	tonne of oil equivalent
TJ	terajoule (1 TJ = 10 <sup>12</sup> joule)
UNFCCC	United Nations Framework Convention on Climate Change
WDR	wetland drainage and rewetting

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