



**Framework Convention on  
Climate Change**

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**Report of the in-depth review of the fifth national  
communication of Portugal**

Parties included in Annex I to the Convention are requested, in accordance with decision 10/CP.13, to submit a fifth national communication to the secretariat by 1 January 2010. In accordance with decision 8/CMP.3, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their fifth national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This report presents the results of the in-depth review of the fifth national communication of Portugal conducted by an expert review team in accordance with the relevant provisions of the Convention and Article 8 of the Kyoto Protocol.

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## I. Introduction and summary

### A. Introduction

1. For Portugal the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Within the burden-sharing agreement of the European Union (EU) for meeting commitments under the Kyoto Protocol, Portugal committed itself to limiting the growth in its greenhouse gas (GHG) emissions to 27 per cent in relation to the base year<sup>1</sup> level during the first commitment period from 2008 to 2012.

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of Portugal, coordinated by the UNFCCC secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 26 April to 1 May 2010 in Lisbon, Portugal, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Mauro Meirelles de Oliveira Santos (Brazil), Mr. Normand Tremblay (Canada), Ms. Yasemin Ürücü (Turkey) and Mr. Abenilde Pires dos Santos (Sao Tome and Principe). Mr. Meirelles de Oliveira Santos and Mr. Tremblay were the lead reviewers. The review was coordinated by Mr. Harald Diaz-Bone and Ms. Inkar Kadyrzhanova (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each section of the NC5. The ERT also evaluated the supplementary information provided by Portugal as a part of the NC5 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by Portugal in its 2010 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

4. In accordance with decision 22/CMP.1, a draft version of this report was communicated to the Government of Portugal, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

### B. Summary

5. The ERT noted that Portugal's NC5 generally complies with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines). As required by decision 15/CMP.1, supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol<sup>2</sup> is provided in the NC5. Portugal considered most recommendations provided in the report of the centralized in-depth review of the fourth national communication of Portugal (NC4).<sup>3</sup> The ERT acknowledged the high degree of coherent and consistent reporting.

6. The supplementary information on the minimization of adverse impacts referred to in paragraph 3 above was found to be mostly complete and transparent and was provided on time. During the review, Portugal provided further relevant information on this matter.

<sup>1</sup> "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

<sup>2</sup> Decision 15/CMP.1, annex, chapter II.

<sup>3</sup> FCCC/IDR.4/PRT.

**1. Completeness**

7. The ERT noted that the NC5 covers all sections required by the UNFCCC reporting guidelines. However, information on the total effect of policies and measures (PaMs) (see para. 85 below), emission projections related to fuel sold to ships and aircraft engaged in international transport (see para. 70 below) and projections for the land use, land-use change and forestry (LULUCF) sector for 2015 and 2020 (see para. 88 below) were not included. The ERT recommends that Portugal include such information in its next national communication. All supplementary information under Article 7, paragraph 2, of the Kyoto Protocol, as stipulated by decision 15/CMP.1, has been provided.

**2. Transparency**

8. The ERT acknowledged that Portugal's NC5, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, is well-structured and concise. The NC5 provides clear information on most aspects of implementation of the Convention and its Kyoto Protocol. The ERT noted that the structure of the NC5 follows the outline contained in the annex to the UNFCCC reporting guidelines, and supplementary information submitted under Article 7, paragraph 2, of the Kyoto Protocol is easily identifiable. However, in reviewing Portugal's NC5, the ERT identified that the information on research provided in the NC5 and in responses to related questions raised by the ERT during the review is not transparent, as it does not provide any updated information on research carried out since the publication of the NC4. The ERT identified this lack of transparency as a potential problem in accordance with paragraph 137(a) of the annex to decision 22/CMP.1 "Guidelines for review under Article 8 of the Kyoto Protocol". In response to this potential problem raised by the ERT, the Party resubmitted its NC5 on 11 June 2010. The ERT noted that the resubmitted NC5 contains a revised section on research, which was found to be complete, consistent with the UNFCCC reporting guidelines and transparent.

9. In the course of the review, the ERT formulated a number of recommendations that could help Portugal to further increase the transparency of its reporting with regard to PaMs (see para. 55 below), projections and total effects of PaMs (see paras. 72 and 90 below), financial resources and technology transfer (see paras. 99, 102 and 103 below), and information on the minimization of adverse effects (see para. 68 below).

**3. Timeliness**

10. The NC5 was submitted on 30 December 2009, before the deadline of 1 January 2010 mandated by decision 10/CP.13. A revised version was submitted on 12 February 2010. In addition, in response to a potential problem raised by the ERT, the Party resubmitted its NC5 on 11 June 2010, within six weeks after the in-country visit.

**II. Technical assessment of the reviewed elements**

**A. National circumstances relevant to greenhouse gas emissions and removals, including legislative arrangements and administrative procedures**

11. In its NC5, Portugal has provided a description of its national circumstances and elaborated on the framework legislations and key policy documents on climate change. The NC5 also contains a description of the national system for the estimation of GHG emissions in accordance with Article 5, paragraph 1, of the Kyoto Protocol. Further technical

assessment of the institutional and legislative arrangements for coordination and implementation of PaMs is provided in section II.B.1 of this report.

## 1. National circumstances

12. In its NC5, Portugal has provided a description of its national circumstances, and information on how these national circumstances affect GHG emissions and removals in Portugal and how changes in national circumstances affect GHG emissions and removals over time. This includes information on the government structure and decision-making process, population, geographical and climatic profile, main economic indicators and relevant economic sectors. The ERT noted that the main drivers of emission trends in Portugal include growth in overall economic activity and variation in the level of precipitation, with the latter having a significant impact on the trend in GHG emissions from electricity production owing to a significant share of hydropower. Table 1 illustrates the national circumstances of Portugal by providing some indicators relevant to GHG emissions and removals.

Table 1

### Indicators relevant to greenhouse gas emissions and removals for Portugal

	1990	1995	2000	2005	2008	Change 1990– 2000 (%)	Change 2000– 2008 (%)	Change 1990– 2008 (%)
Population (million)	10.00	10.03	10.23	10.55	10.62	2.3	3.8	6.2
GDP (2000 USD billion using PPP)	131.46	143.05	174.75	182.52	188.42	32.9	7.8	43.3
TPES (Mtoe)	16.74	20.21	24.67	26.44	24.16	47.4	–2.1	44.3
GDP per capita (2000 USD thousand using PPP)	13.15	14.26	17.08	17.30	17.74	29.9	3.9	35.0
TPES per capita (toe)	1.67	2.01	2.41	2.51	2.27	44.4	–5.7	36.2
GHG emissions without LULUCF (Tg CO <sub>2</sub> eq)	59.29	69.98	81.30	86.62	78.38	37.1	–3.6	32.2
GHG emissions with LULUCF (Tg CO <sub>2</sub> eq)	63.76	70.49	79.90	91.88	75.42	25.3	–5.6	18.3
CO <sub>2</sub> emissions per capita (Mg)	4.36	5.28	6.23	6.47	5.61	42.8	–9.9	28.6
CO <sub>2</sub> emissions per GDP unit (kg per 2000 USD using PPP)	0.33	0.37	0.36	0.37	0.32	9.9	–13.3	–4.7
GHG emissions per capita (Mg CO <sub>2</sub> eq)	5.93	6.98	7.95	8.21	7.38	34.0	–7.1	24.5
GHG emissions per GDP unit (kg CO <sub>2</sub> eq per 2000 USD using PPP)	0.45	0.49	0.47	0.47	0.42	3.2	–10.6	–7.8

*Data sources:* (1) GHG emissions data: Portugal's 2010 greenhouse gas inventory submission; (2) Population (annual average), GDP and TPES data: International Energy Agency.

*Abbreviations:* GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

*Note:* The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

13. The Portuguese Republic is a democratic State that is based upon the rule of law, the sovereignty of the people, the pluralism of democratic expression and democratic political organization, respect for and effective guarantees of fundamental rights and freedoms, and the separation and interdependence of powers. It is a unitary State that is structured and functions under the rule of the self-governing system of the islands and the principles of subsidiarity, the autonomy of local authorities and the democratic decentralization of the public service. The archipelagos of the Azores and Madeira constitute autonomous regions with their own political and administrative statutes and their own institutions of self-government. In 2009, the national economy was hit by the global financial and economic crisis. The state budget deficit amounted to 8.6 per cent of gross domestic product (GDP). Total public debt rose from 82.9 to 92.4 per cent of GDP in 2010. The unemployment rate was 10.8 per cent in 2010.

14. The 2001 National Strategy on Climate Change entrusts the Ministry for Environment and Spatial Planning (MAOT) with the responsibility for spearheading and coordinating at government level the development of programmes and actions to limit growth in GHG emissions. The Climate Change Commission (CAC), established in 1998, includes representatives of all relevant ministries and, under the coordination of MAOT, addresses the transversal nature of issues related to climate change. Implementation of the Kyoto Protocol is underpinned by the 2006 National Climate Change Programme (PNAC), the national Kyoto Protocol compliance monitoring system,<sup>4</sup> the National System for the Estimation of Emissions by Sources and Removals by Sinks of Air Pollutants (SNIERPA), participation in the EU emissions trading scheme (EU ETS) as defined by the National Allocation Plan (PNALE), and the Portuguese Carbon Fund. Some PaMs are implemented at the local and regional levels. Further legislative arrangements and administrative procedures, including those for the national system and the national registry, are presented in chapters II.A.3 and II.B of this report.

15. Portugal has provided summary information on the GHG emission trends for the period 1990–2007 in section 2.3 of the NC5. This information is consistent with the 2009 national GHG inventory submission. Furthermore, summary tables for emissions in carbon dioxide equivalent (CO<sub>2</sub> eq) (given in the common reporting format) have been provided in an annex to the NC5 for 1990 and 2007, referring to the 2009 GHG inventory submission. The ERT noted that Portugal did not include tables on GHG emission trends as required by the UNFCCC reporting guidelines for the period 1990–2007 in its NC5 that was initially submitted on 30 December 2009 and resubmitted on 12 February 2010. However, the ERT noted that in the annex of the revised NC5 submitted on 11 June 2010 the summary tables for emissions in CO<sub>2</sub> eq (given in the common reporting format) for 1990 and 2008 and tables on GHG emission trends for the period 1990–2008 have been provided, as required by the UNFCCC reporting guidelines. The ERT recommends that the Party follow the UNFCCC reporting guidelines more closely and include such tables in its next national communication. During the review, the ERT assessed Portugal's most recent 2010 GHG inventory submission and its findings are reflected in this report.

16. Total GHG emissions excluding emissions and removals from LULUCF increased by 32.2 per cent between the base year and 2008, whereas total GHG emissions including net emissions or removals from LULUCF increased by 18.3 per cent (see table 2). This was mainly attributed to CO<sub>2</sub> emissions, which increased by 36.6 per cent over this period. Emissions of methane (CH<sub>4</sub>) increased by 26.3 per cent, while emissions of nitrous oxide

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<sup>4</sup> <[www.CumprirQuioto.pt](http://www.CumprirQuioto.pt)>.

(N<sub>2</sub>O) decreased by 10.7 per cent. A major part of these changes was experienced before 2005; the emission trends for the period 1990–2005 are as follows: CO<sub>2</sub> +56.7 per cent, CH<sub>4</sub> +22.1 per cent, N<sub>2</sub>O –7.4 per cent and total GHG emissions +46.1 per cent. However, after 2005 there was a major change in this trend, as the emission trends for the period 2005–2008 are as follows: CO<sub>2</sub> –12.8 per cent, CH<sub>4</sub> +3.5 per cent, N<sub>2</sub>O –3.5 per cent and total GHG emissions –9.5 per cent). Emissions of fluorinated gases accounted for about 0.1 per cent of total GHG emissions in 1995 and 1.3 per cent in 2008. Table 2 provides an overview of GHG emissions by sector from the base year, 1990, to 2008 (see also the discussion of sectoral trends in chapter II.B of this report).

Table 2  
**Greenhouse gas emissions by sector in Portugal, 1990–2008**

Sector	GHG emissions (Tg CO <sub>2</sub> eq)						Change (%)		Shares by sector <sup>a</sup>	
							1990–	2007–	1990	2008
	1990	1995	2000	2005	2007	2008	2008	2008		
1. Energy	40.38	48.92	59.44	63.82	56.98	55.48	37.4	–2.6	68.1	70.8
A1. Energy industries	16.01	19.35	21.08	25.18	19.80	19.21	20.0	–3.0	27.0	24.5
A2. Manufacturing industries and construction	9.26	10.29	12.03	10.97	10.77	10.22	16.3	–5.1	15.6	13.0
A3. Transport	10.11	13.33	19.18	19.67	19.59	19.29	90.7	–1.5	17.1	24.6
A4.–A5. Other	4.71	5.32	6.42	7.15	5.82	5.43	15.2	–6.7	8.0	6.9
B. Fugitive emissions	0.28	0.63	0.73	0.85	1.01	1.33	372.7	31.1	0.5	1.7
2. Industrial processes	4.61	5.65	6.08	6.77	6.99	6.92	50.2	–0.9	7.8	8.8
3. Solvent and other product use	0.33	0.32	0.31	0.31	0.27	0.26	–20.2	–1.7	0.6	0.3
4. Agriculture	8.04	8.03	8.68	7.98	7.94	7.84	–2.5	–1.4	13.6	10.0
5. LULUCF	4.47	0.52	–1.40	5.26	–2.64	–2.96	–	12.1	7.5	–3.8
6. Waste	5.93	7.05	6.80	7.74	7.69	7.88	32.9	2.5	10.0	10.1
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>GHG total with LULUCF</b>	<b>63.76</b>	<b>70.49</b>	<b>79.90</b>	<b>91.88</b>	<b>77.23</b>	<b>75.42</b>	<b>18.3</b>	<b>–2.3</b>	<b>NA</b>	<b>NA</b>
<b>GHG total without LULUCF</b>	<b>59.29</b>	<b>69.98</b>	<b>81.30</b>	<b>86.62</b>	<b>79.87</b>	<b>78.38</b>	<b>32.2</b>	<b>–1.9</b>	<b>100.0</b>	<b>100.0</b>

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

Note: The changes in emissions and the shares by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

<sup>a</sup> The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.

17. Major forest fires in 2003 and 2005 had a considerable impact on the overall GHG emission trend, as they led to significant increases in emissions in these two years. A decrease in total GHG emissions since 2005 can be observed, which is largely due to an increase in the use of renewable energy sources (RES), mainly wind power. The most recent decline in GHG emissions from almost all sectors during the period 2007–2008 might be attributed, to some extent, to the effects of the global financial and economic crisis. The ERT noted that this trend analysis suggests the beginning of decoupling of economic growth and GHG emissions. However, the ERT noted that GDP and total primary energy supply (TPES) grew in almost equal proportions between 1990 and 2008. In addition, emissions per capita and per GDP grew until 2005 and started to decline only thereafter. As hydropower holds a significant share in electricity production (22.1 per cent of total electricity production in 2007), the variability in annual precipitation – which was below the average for most of the last decade in Portugal – resulted in fluctuating emissions from the backup electricity production from thermal power plants.

## 2. National system

18. In accordance with decision 15/CMP.1, Portugal provided in its NC5 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1 (decision 19/CMP.1). The ERT noted that this description covers all the elements as required by the “Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol” (as contained in the annex to decision 15/CMP.1).

19. During the review, Portugal provided additional information on the national system, elaborating on the quality assurance/quality control (QA/QC) procedures for its GHG emission inventory. At the request of the ERT, the QA/QC manual was presented to the ERT. Portugal indicated to the ERT that the procedures for the review of activity data and emission factors by external consultants who are not directly involved in the development and compilation of the national GHG emission inventory could be improved, once the procedures set out in the QA/QC manual have been fully implemented. The ERT encourages Portugal to fully implement these procedures.

20. The ERT noted that Portugal addressed the recommendation of the previous ERT to include, in the description of the national system, information on additional arrangements regarding the formal agreements on the provision by Statistics Portugal of confidential data on industry activities. The ERT concluded that the national system continued to perform its required functions as set out in decision 19/CMP.1.

21. Portugal provided a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contribute to the conservation of biodiversity and sustainable use of natural resources. Regarding information under Article 3, paragraph 4, of the Kyoto Protocol, as contained in the supplementary tables for reporting on LULUCF under the Kyoto Protocol, the ERT noted that net emissions and removals related to cropland management and grazing land management, both of which activities have been elected together with the forest management for accounting in the first commitment period, have not been provided. Recognizing that the application of the relevant methodology of the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land use, Land-Use Change and Forestry* is still being developed by the Party, the ERT recommends that Portugal ensure the full performance of all general and specific functions of the national system,



including those concerning information on net emissions and removals related to cropland management and grazing land management.

### **3. National registry**

22. In its NC5, Portugal has provided information on the national registry, including a description of how its national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and how it complies with the requirements of the technical standards for data exchange between registry systems. The ERT noted that the description of the national registry does not include a list of the information publicly accessible via the user interface of the national registry. Furthermore, not all the required information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1 was available on the website of the national registry at the time of the review. The ERT recommends that Portugal provide a list of the information publicly accessible on this website in its next national communication, and that it present on this website all the required information in line with the guidance provided in paragraphs 45–48 of the annex to decision 13/CMP.1.

23. During the review, the Party provided additional information on the measures put in place to safeguard, maintain and recover registry data, the security measures employed in the registry to prevent unauthorized manipulations, the measures put in place to protect the registry against security compromises, the test procedures related to performance of the current version of the national registry and the recording of the changes to and discrepancies of the national registry. The Party also demonstrated to the ERT how it records the changes related to the national registry and how it maintains these records. However, the ERT noted that firewall-software logs for all authorized or blocked accesses are kept on tape with an off-site vaulting solution for only 10 years. The ERT also noted that updates of databases and applications, implemented security measures and changes to the national registry software are documented on a regular basis by nominated responsible persons. The ERT recommends that Portugal adhere to section 7 of the technical standards for data exchange, which specifies a period of at least 15 years “until, at a minimum, the end of the second commitment period after the latest crediting period of the associated units”.

24. The ERT took note of the conclusion of the standard independent assessment report that the national registry continues to maintain sufficient capacity to ensure the accurate accounting of Kyoto Protocol units and that it continues to conform to the technical standards for data exchange between registry systems. The ERT concluded that Portugal’s national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1, with the exception noted in paragraph 23 above.

## **B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol**

25. As required by the UNFCCC reporting guidelines, Portugal has provided in its NC5 comprehensive and well-organized information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. Each sector has its own textual description of the principal PaMs, supplemented by summary tables on PaMs by sector. Portugal has also provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals, consistent with the objective of the Convention. The NC5 describes a similar set

of PaMs to that in the NC4, supplemented by a number of new PaMs that were adopted in 2007.

26. The Party has provided comprehensive information on PaMs at the national and subnational/regional levels. The package of measures reflects the domestic profile of emissions by sources and removals by sinks according to the national inventory.

27. The ERT noted that Portugal followed the UNFCCC reporting guidelines in organizing the reporting by the following sectors: energy, transport, industry, agriculture, forestry and waste management. Each sector has its own textual description of the principal PaMs, supplemented by summary tables by sector. The ERT noted that estimates of their effects were provided for most of the PaMs. However, the ERT noted that information on the financial implications associated with the implementation of PaMs was not provided. In addition, the ERT noted that the NC5 did not include information on the fiscal effects of implemented PaMs (e.g. taxes, levies and subsidies). The ERT encourages Portugal to include a table with information on the costs of implementation of its PaMs in its next national communication.

28. During the review, the Party provided information on new and updated PaMs, such as the New National Energy Strategy 2020 (NNES2020), which was approved by the Cabinet of Ministers on 15 April 2010. The main objectives of the strategy up to 2020 are to reduce the dependence on energy imports from 83.3 per cent (in 2008) to 74.0 per cent, to increase the share from RES in gross final energy consumption to 31 per cent, to increase the share of electricity produced from RES in total electricity production to 60 per cent, and to reduce final energy consumption by 20 per cent.

29. In 2010 Portugal also introduced a new Portuguese Climate Policy, *Kyoto 2020 and Beyond*, which focuses on three priorities: (a) to comply with the Kyoto Protocol; (b) to develop a low-carbon strategy and second generation PNAC; and (c) to implement the National Adaptation Strategy, foster stakeholders' engagement and raise awareness.

30. The NC5 provides estimates of the individual effects of PaMs by sector and by gas. PNAC monitors, evaluates and estimates the effects of PaMs on a quarterly basis and determines, through the national Kyoto Protocol compliance monitoring system, the progress that has been accomplished and the potential need to implement additional PaMs in order for Portugal to meet its emission limitation target under the Kyoto Protocol.

31. The ERT acknowledged the efforts made by Portugal to develop and bring forward policies, measures and instruments to deliver on its commitment to limit its GHG emissions. A total of 44 PaMs, based on economic and regulatory instruments, as included in the 2006 PNAC, were proposed in the different sectors (energy, transport, agriculture, forestry and waste) to address the increase in emissions. The ERT noted that new targets had been introduced since the release of the NC4, such as a 10 per cent biofuel content in transport fuels by 2010, and the targets of NNES2020 (see para. 28 above). Portugal has also set up the Portuguese Carbon Fund to purchase carbon credits and support domestic projects in order to cover any shortfall. Table 3 provides a summary of the reported information on PaMs in Portugal.

32. Among the EU-wide policies that are implemented in Portugal, the EU ETS plays a fundamental role in reducing Portugal's GHG emissions. In Portugal, the EU ETS covered 244 installations during the first phase (2005–2008) and 212 and 220 in 2008 and 2009 (corresponding to the second phase, 2008–2012), respectively, which are responsible for approximately 50 per cent of Portugal's CO<sub>2</sub> emissions. The ERT was informed that, for the third allocation phase (2013–2020), auctioning will be the main allocation method as opposed to 'grandfathering'.

Table 3  
**Summary of information on policies and measures**

<i>Major policies and measures</i>	<i>Examples/comments</i>
<i>Framework policies and cross-sectoral measures</i>	
Integrated climate change strategy	Strategy was introduced in 2001 and is linked to the Climate Change Programme – updated in 2004–2006, with additional measures in 2007, including the National Allocation Plan, the Portuguese Carbon Fund; and the Green Public Procurement System
New National Energy Strategy 2020	Aims to reduce the country's dependence on energy imports to 74 per cent by 2020 and achieve the following targets: (a) 31 per cent of energy from renewable energy sources (RES) in gross final energy consumption; (b) 60 per cent of electricity generated from RES; and (c) 20 per cent reduction in final energy consumption
National Forest Strategy 2006–2030	Strategy was approved in 2006 and constitutes one of the key elements to address the general objectives of the forest policy, which are: (a) to protect existing forests/sinks; (b) to improve forest management; and (c) to increase forest area and standing volume
Emissions trading	Pricing of CO <sub>2</sub> emissions from the European Union (EU) emissions trading scheme (–21 per cent during 2005–2020)
<i>Policies and measures by sector</i>	
<i>Energy</i>	
Renewable energy sources	Electricity from RES in 2010: 45 per cent of total electricity generation (458 kt); Solar Hot Water Programme (101 kt); Increase of renewable installed capacity (370 kt);
Energy efficiency	Demand-side management of electricity consumption (795 kt); Implementation of EU directives on New Buildings Energy Efficiency; Energy Efficiency in Electricity Generation (146 kt); Preferential treatment for combined heat and power; Tax on industrial fuels according to CO <sub>2</sub> emissions (78 kt); Cogeneration: fuel shift from oil to natural gas (189 kt)
Clima2020	Implementation of the European climate and energy package
<i>Transport</i>	
Biofuels	Increase content of biofuels in transport fuels from 5.75 to 10 per cent by 2010 (655 kt)
Vehicle and fuel taxes	Tax harmonization of diesel oil for heating and for transport (59 kt)
<i>Industry</i>	
Pollution prevention and control	Implementation of the Integrated Pollution Prevention and Control (IPPC) directive
Substitution of gases with high global-warming potential	Implementation of the EU directive on fluorinated gases
<i>Agriculture</i>	
	Evaluation and promotion of carbon sequestration in agricultural soil (500 kt); treatment of and energy recovery from livestock waste (429 kt)

<i>Major policies and measures</i>	<i>Examples/comments</i>
<i>Forestry</i>	Programme for the Sustainable Development of Portuguese Forests (3,743 kt); promotion of carbon sink capacity of forests (800 kt)
<i>Waste management</i>	Directive on packaging and packaging waste (900 kt); landfill directive (363 kt); IPPC directive

*Note:* Estimates for greenhouse gas emission reductions, given for some measures (in parentheses), are reductions in CO<sub>2</sub> or CO<sub>2</sub> eq for the year 2010.

33. The ERT noted that, while some of Portugal’s PaMs are innovative (for example, support of electric vehicles, RES and energy efficiency in new buildings), the estimated overall mitigation effect is very ambitious, and meeting the overall objective could be a challenge, given the uncertainty in economic and fiscal development as well as the rate of technology penetration.

34. The ERT also noted that the PaMs that were reported in the NC4 remained in place. Portugal is expecting to conduct a thorough review in the near future of all of the measures that have been introduced, in order to determine their respective efficiency and decide which PaMs should be dropped from the current portfolio.

35. Portugal did not report on policies and practices which encourage activities that lead to higher levels of anthropogenic GHG emissions than would otherwise occur.

**1. Policy framework and cross-sectoral measures**

36. The Government of Portugal bears full responsibility for ensuring the fulfilment of the country’s international commitments under the Convention and its Kyoto Protocol. In 2001, the Government approved the National Strategy on Climate Change, which entrusts MAOT with the responsibility for overseeing at government level the development of programmes and actions to limit growth in GHG emissions.

37. Given the transversal nature of issues related to climate change, in 1998 the Government established CAC. CAC is tasked with the coordination of climate change policy across the range of ministries and governmental agencies with relevant competencies, as well as with ensuring that such issues are duly considered in the full range of sectoral policies. CAC is coordinated by MAOT and includes representatives of the Ministry of Internal Administration, the Ministry for Foreign Affairs (MNE), the Ministry of Finance and Public Administration (MFAP), the Ministry of Economy, Innovation and Development (including energy and industry) (MEID), the Ministry of Agriculture, Rural Development and Fisheries (including forests) (MADRP), the Ministry of Public Works, Transport and Communications (MOPTC), the Ministry of Education and the Ministry of Science, Technology and Higher Education, as well as representatives of the autonomous regions of the Azores and Madeira.

38. In 2006, CAC was appointed as the Portuguese designated national authority (DNA) for the Kyoto Protocol mechanisms, responsible for, among other functions, promoting Portuguese investments in these mechanisms. The Executive Committee of CAC (CECAC) was created in 2006 to support CAC in its role as Portuguese DNA and in the coordination of climate change policies. CECAC is also the technical manager of the Portuguese Carbon Fund. CECAC is coordinated by a representative of MAOT and its board includes representatives of MFAP, MEID, MNE, MADRP and MOPTC.

39. The main elements of the national climate policy to ensure compliance with the national GHG emission limitation target and the implementation of the Kyoto Protocol include PNAC, the national Kyoto compliance monitoring system, SNIERPA, participation in the EU ETS as defined by PNALE, and the Portuguese Carbon Fund.

40. Since 2007, further competences in the field of climate policy, including supervision of the Portuguese Carbon Fund, monitoring PNAC and participation in international negotiations under the Convention and the Kyoto Protocol, have been transferred to CECAC, while coordination of SNIERPA and participation in the EU ETS remain the responsibility of the Portuguese Environment Agency.

41. PaMs included in PNAC are pursuant to the transposition of EU directives into national legislation and the application of other types of EU-wide instruments, for example policies implemented in the context of the European Climate Change Programme, as well as some measures specifically developed by Portugal. At the local level, local authorities play a very important role in implementing PaMs and in promoting awareness of issues relating to climate change, as these are the governmental bodies closest to the citizens and also the ones that can drive forward significant changes, especially in the behaviour of individuals and small and medium-sized enterprises.

42. The 2006 PNAC comprises PaMs implemented or adopted in all sectors by 1 January 2005, including activities of afforestation and reforestation under Article 3, paragraph 3, of the Kyoto Protocol. Furthermore, additional PaMs adopted or at the planning stage after that date were included in the 2006 PNAC as additional measures, including forest management, cropland management and grazing land management activities under Article 3, paragraph 4, of the Kyoto Protocol. Finally, PNAC was reviewed again in 2007 and a new set of PaMs built in that mainly address energy supply and biofuels. According to the NC5, the mitigation effect of these new measures was estimated at 1.56 Mt CO<sub>2</sub> eq per year. The ERT was informed that the overall impact of the 2007 revised PNAC should lead to total GHG emissions of 79.5 Mt CO<sub>2</sub> eq, which is 3.11 Mt CO<sub>2</sub> eq per year above the Party's Kyoto Protocol target of 76.39 Mt CO<sub>2</sub> eq. Portugal expects that the Portuguese Carbon Fund would cover most of the gap, covering approximately 2.88 Mt CO<sub>2</sub> eq per year.

43. The ERT noted Portugal's comprehensive approach both to policy design, by means of the Portuguese Climate Policy, Kyoto 2020 and Beyond, and its new Energy Framework, and to the implementation and monitoring of effectiveness of its PaMs, which should provide the necessary basis for Portugal to meet its emission limitation target under the Kyoto Protocol.

44. During the review, Portugal provided the ERT with a number of sectoral strategies, for example towards the introduction of electric vehicles in Portugal, that have been developed in order to meet Portugal's reduction targets over several time horizons. However, given the strong impact of the global financial crisis on the Portuguese economy, the degree of implementation of these strategies as well as their mitigation effect may be affected. However, Portugal informed the ERT about its commitment to deliver on the existing emission reduction targets.

45. In 2009, Portugal finalized the study Clima2020 which evaluates the GHG emission scenarios until 2020 in order to determine the impacts of the European climate and energy package. Clima2020 was carried out by a team of researchers from the New University of Lisbon. The EU climate and energy package consists of a range of measures adopted by the EU member States to fight against climate change and was adopted by the European Parliament in December 2008. The package focuses on EU-wide GHG emission cuts (-20 per cent), RES (share of 20 per cent in gross final energy consumption) and energy savings (of 20 per cent) through energy efficiency improvements by 2020. Portugal's goals under

the package for the target year 2020 are: to contribute linearly to a 21 per cent reduction of emissions in the sectors covered by the EU ETS; to limit growth in emissions to 1 per cent in sectors not covered by the EU ETS (non-ETS sectors) compared with the 2005 level); and to achieve a share of 31 per cent RES in gross final energy consumption, and a 10 per cent biofuel content in transport fuels.

46. The ERT noted with great interest the method for tracking emission reductions that has been developed in the context of the national Kyoto Protocol compliance monitoring system (see paras. 14 and 30 above), and encourages Portugal to continue with the refinement of the model. This model should allow Portugal to make the necessary adjustments in case the current PaMs are not delivering the expected reductions.

## 2. Policies and measures in the energy sector

47. The energy sector is the greatest contributor of CO<sub>2</sub> emissions in Portugal, responsible for 90.3 per cent of total CO<sub>2</sub> emissions in 2008, compared with 90.2 per cent in 1990. Between 1990 and 2008, CO<sub>2</sub> emissions from the energy sector increased by 37.4 per cent. This overall increase was mainly driven by a 20 per cent increase in emissions from energy industries and a 90.7 per cent increase in emissions from transport. The high dependency on fossil fuels for power generation and the continued expansion in the domestic vehicle fleet (an increase of 143 per cent between 1990 and 2008 with respect to the number of cars per thousand inhabitants, from 171 to 415) and in road transport (fuel use in road transport increased by 98.4 per cent between 1990 and 2008) were key drivers of the increase in emissions.

48. Between 1990 and 2008, the trend in GHG emissions from fuel combustion showed notable increases in transport (+90.7 per cent) and energy use in other sectors (+15.2 per cent). Between 2000 and 2009, the number of registered passenger cars increased by an average of 215,434 per year, whereas national road freight transport (expressed in tonne-kilometres) increased by 21.9 per cent between 1990 and 2007. In the residential and commercial sectors, thermal insulation and the use of solar energy did not outweigh the growing number of dwellings, the improved standard of living and the increasing floor area of commercial premises.

49. **Energy supply.** Between 1990 and 2008, TPES increased by 44.3 per cent. In 2007, mineral oil held the largest share in TPES (53.8 per cent), followed by RES (17.2 per cent), natural gas (15.1 per cent), coal (11.4 per cent) and electricity imports (2.5 per cent). The introduction of natural gas in 1997 helped to reduce the share of mineral oil in TPES (66.6 per cent in 1990), which reduced the dependence on imported oil. Portugal has a limited amount of indigenous resources and is dependent upon external sources to meet demand; 82.8 per cent of fossil fuels were imported in 2007. Nuclear energy was not considered to be an option in the country.

50. **Renewable energy sources.** Portugal has devoted significant effort to boosting the contribution of RES (hydropower, wind, solar and biomass), which accounted for 35.7 per cent of total electricity production in 2007. Hydropower holds a large share and contributed 22.1 per cent of total electricity production in 2007. However, the contribution of hydropower has fluctuated over the years in line with variations in annual precipitation (see para. 17 above). The ERT noted with interest that wind power registered important growth, by 7,489.7 per cent (from 29 MW to 2,201 MW installed capacity), during 1997–2007 and accounted for 28.8 per cent of RES at the end of that period. Portugal has set a strategic goal of producing at least 45 per cent of electricity from RES in 2010 and 60 per cent in 2020, mainly through the installation of large hydropower and wind power plants. By 2020, eight new hydropower plants, with an installed capacity of 1,300 MW, will be built, while the installed capacity of wind power is planned to almost quadruple by 2020, to 8,500 MW. Public and private investment needs for these expansion plans amount

to EUR 32 billion, and Portugal expects the expansion of RES to have an important effect on the domestic labour market, creating 121,000 additional jobs in this sector. The ERT commended the Party for its ambitious strategy.

51. **Energy efficiency.** The National Plan of Action for Energy Efficiency (PNAEE) was approved in 2008, and comprises a set of measures aiming at the improvement of energy efficiency by 10 per cent relative to the final energy consumption and energy services by 2015. The plan addresses energy demand management and covers four specific areas: transport, residential and commercial sector, industry and public sector. Additionally, it establishes three cross-cutting priority areas – consumer behaviour, taxes, financing and incentives. For these areas, a dozen programmes of action were created to address several branches of energy efficiency, including through vehicle renewal, urban mobility, energy-efficient industry, buildings and transport systems, and home and office renovation. The ERT commended Portugal for these programmes of action and encourages the Party to report on implementation and monitoring results in its next national communication.

52. **Residential and commercial sectors.** Energy consumption in the residential and commercial sectors registered a significant increase in 1990–2005 (+53.5 per cent), but this growth slowed down after 2005 (+15 per cent increase during 2006–2008), owing partly to the stagnation in economic growth and also to some other factors, including energy efficiency measures. The transposition of the EU directive on the energy performance of buildings resulted in the implementation of energy performance certificates and the inspection of boilers and air-conditioning systems. The PNAEE also draws on this important sector (see para. 51 above).

53. **Transport sector.** Emissions from the transport sector, which is largely dominated by road transport, increased the most among all sectors. During 1990–2008, emissions increased by 91 per cent owing to the continuous growth of the vehicle fleet and in road travel, which was in turn associated with the growth in average household income and a strong investment in road infrastructure in the 1990s. The ERT noted that this sector will remain a challenge in terms of its increasing emissions, given the difficulty of implementing PaMs in this sector and the fact that a number of implemented PaMs are not delivering the expected reductions in GHG emissions (e.g. the EU voluntary agreement with car manufacturers on reducing average CO<sub>2</sub> emissions from newly sold passenger cars).

54. The ERT also noted that a significant number of PaMs in the transport sector had not produced the expected emission reductions, such as the expansion of the Lisbon metro or the construction of the Metro Sul de Tejo of Oporto and the Metro Ligeiro do Mondego. According to the 2009 study *Clima2020*, emissions from transport should increase by 9 per cent from 2005 to 2020. Such a scenario could mean that meeting the emission limitation target of the non-ETS sectors (+1 per cent by 2020) could turn out to be a challenge if emissions from transport cannot be contained in the near future.

55. With respect to aviation and marine bunker fuels, the Party reported that it played an active role in the discussions addressing emissions from international air and maritime transport under the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO). However, the ERT noted that Portugal did not identify the steps taken to promote and implement any decisions by IMO or ICAO in order to limit or reduce emissions of GHGs not controlled by the Montreal Protocol from marine and aviation bunker fuels. During the review, Portugal reported that international aviation, which covers all arriving and departing flights from EU airports, will be included in the EU ETS from 2012 onwards. The ERT recommends that Portugal include additional information on marine and aviation bunker fuels and the mitigation of emissions from such fuels in its next national communication.

56. The ERT welcomed the approach taken by Portugal, which focuses on the development of a comprehensive, well-designed set of PaMs and strategies to meet the established goals for mitigation of climate change. The ERT also noted, however, that meeting these ambitious goals might be challenging, given the uncertainty in economic and fiscal development, as well as the rate of technology penetration.

### 3. Policies and measures in other sectors

57. Between 1990 and 2008, GHG emissions from industrial processes (including solvent and other product use), agriculture and waste increased by 21.1 per cent, mainly driven by increases in emissions from mineral products, chemical industries and waste. The trend in GHG emissions from industrial processes showed notable increases (+50.2 per cent), which were partly compensated for by decreases in emissions from solvent and other product use (-20.2 per cent) and agriculture (-2.5 per cent), as well as by LULUCF, which was a net source of emissions in 1990 (4,472 Gg CO<sub>2</sub> eq) and became a net sink in 2008 (2,958 Gg CO<sub>2</sub> eq).

58. **Industrial processes.** GHG emissions from this sector grew by 50.2 per cent between 1990 and 2008, driven primarily by the increase in CO<sub>2</sub> emissions from the production of ammonia, cement and lime, and the increase in fluorinated gases. Despite being responsible for a large share of the increase in non-energy emissions from 1990 to 2008 (57.6 per cent of the increase), the ERT noted that no PaMs have been reported for this sector. The adoption of the EU directive on fluorinated gases and the implementation of the EU directive on integrated pollution prevention and control are mentioned in the NC5 as cross-cutting measures, but estimated mitigation effects were not provided. The ERT noted that Portugal provided limited information on the PaMs in industry, and encourages the Party to provide more contextual information on PaMs in its next national communication.

59. **Agriculture.** The agriculture sector was the second most significant source of GHG emissions in 1990 with a share of 13.6 per cent. In 2008 it became responsible for 10.0 per cent of total GHG emissions, after a decrease in emissions of 2.5 per cent since 1990. This emission reduction resulted from the decrease in agricultural activity, which was linked to the replacement of arable crops with permanent pasture, a general decrease in animal production and a decrease in fertilizer consumption.

60. The ERT noted that Portugal is in the process of the evaluation and promotion of carbon sequestration in agricultural soil (election of forest management, cropland management, grazing land management activities under Article 3, paragraph 4, of the Kyoto Protocol) and the treatment of and energy recovery from livestock waste (reduction of CH<sub>4</sub> emissions). The ERT noted with interest the approach taken by Portugal with respect to the use of the Portuguese Carbon Fund as a funding mechanism to support domestic projects such as the installation of new permanent biodiverse pastures.

61. **Forestry.** The forestry sector accounted for a net removal of 2,958 Gg CO<sub>2</sub> eq in 2008, which represents approximately 3.8 per cent of total GHG emissions (without LULUCF). The ERT noted the significant emissions and removals fluctuations that occurred in this sector, from being a net emitter in 1990 (4,474 Gg CO<sub>2</sub> eq) to a carbon sink over a number of consecutive years. One of the reasons for this, as indicated by Portugal, is the occurrence of major forest fires in 2003 and 2005.

62. In addition, the sector faces three major challenges, namely the abandonment of agriculture lands, forest fires, and outbreaks of pests and diseases. Portugal has introduced a number of PaMs to address these challenges. The general objectives of the forest policy are to protect existing forests, improve forest management and increase forest area and standing volume. The main instruments to deliver on these objectives are the National Forest



Strategy 2006–2030, approved in 2006, as well as regional forest management plans and the installation of forest intervention zones.

63. The ERT noted that significant efforts have been made to enhance the contribution of this sector to emission mitigation in the overall approach to addressing climate change.

64. **Waste management.** Emissions from the waste sector represented 10.1 per cent of total GHG emissions in 2008, and increased by 32.9 per cent between 1990 and 2008. This significant increase is primarily due to a rise in waste generation (following the growth in average household income and the urbanization that occurred over the last decade) and the deposition of waste in landfills. However, Portugal informed the ERT that the different PaMs introduced or planned should result in a 26 per cent reduction in sectoral emissions by 2020. The ERT encourages the Party to closely monitor the implementation of PaMs in the waste sector.

65. The ERT was informed that significant efforts are being implemented in 2010–2011 in order to (a) reduce the amount of waste transferred to landfill – a reduction from 65 per cent in 2008 to 25 per cent in 2016; (b) increase the share of waste incinerated from 18 per cent to 20 per cent; (c) increase organic recovery from 8 per cent to 35 per cent; and (d) increase the share of waste collected separately from 9 per cent to 20 per cent.

66. The ERT welcomed the efforts made by Portugal in the design and implementation of comprehensive PaMs and strategies to meet its commitments under the Kyoto Protocol. The ERT noted, however, that meeting some of the related policy goals, such as targets on RES electricity and biofuels, will depend on economic and fiscal recovery as well as the rate of technology penetration.

#### **4. Minimization of adverse effects in accordance with Article 2, paragraph 3, of the Kyoto Protocol**

67. In its NC5, Portugal reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts, on other Parties, especially developing country Parties. Further information on how Portugal strives to implement its commitments under Article 3, paragraph 1, in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, as reported in the 2010 annual submission, is presented in chapter II.I of this report.

68. Portugal informed the ERT that measures related to the diversification of primary energy sources could have positive effects on Portugal's emission reductions and on the economies of some fossil fuel exporting countries. It was also indicated that Portugal is minimizing adverse effects on developing countries by the implementation of a broad portfolio of instruments and the wide-ranging coverage of all sectors of the economy. The ERT recommends that the Party provide more detailed information on this matter in its next national communication.

### **C. Projections and the total effect of policies and measures, and supplementarity relating to the Kyoto Protocol mechanisms**

#### **1. Projections overview, methodology and key assumptions**

69. The GHG emission projections provided by Portugal in the NC5 include a 'with measures' and a 'with additional measures' scenario until 2020. The projections are presented relative to actual inventory data, as recommended in the UNFCCC reporting guidelines, and for the years 2010 and 2020, with 2005 selected as the base year for the

projections. The projections are presented on a sectoral and subsectoral basis, using the same sectoral categories used in the PaMs section, and on a gas-by-gas basis for the following GHGs: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and fluorinated gases (as a group). Projections are also provided in an aggregated format for each sector as well as for a national total, using global warming potential values.

70. The ERT noted that emission projections related to fuel sold to ships and aircraft engaged in international transport were not reported, although this is a reporting element required by the UNFCCC reporting guidelines. The ERT reiterates the recommendation made in previous review reports that Portugal report such emission projections in line with the UNFCCC reporting guidelines in its next national communication.

71. The projections in the NC5 are based on the study Clima2020 (see also para. 45 above), which assessed the impacts of the 2008 EU climate and energy package in Portugal.

72. **Methodology.** The projections for the energy sector were calculated using a technology-based integrated assessment model that covers economy, energy and the environment (the Integrated MARKAL-EFOM System for Portugal, or TIMES\_PT model).<sup>5</sup> The goal of TIMES\_PT is to satisfy the demand for energy services at minimum cost. TIMES\_PT covers the following sectors of the Portuguese energy system: primary energy supply, electricity generation, industry, residential, commercial, agriculture and transport. In each sector, the monetary, energy and material flows are modelled taking into account various technologies for energy production and consumption. The Party informed the ERT that the economic interactions outside the energy sector were not modelled. Projections for the non-energy sectors included spreadsheet models for the industrial processes (fluorinated gases), agriculture, LULUCF and waste sectors. The ERT encourages Portugal to provide more detailed information on this methodology in its next national communication, in order to allow the reader to obtain a basic understanding of the models used and its strengths and weaknesses. The ERT also encourages the Party to elaborate on the main differences in assumptions, methods and approaches used between the NC5 and its next national communication.

73. **Assumptions.** In the NC5, a number of sectoral assumptions for the projections were provided in the form of policy scenarios and information on certain input parameters, such as macroeconomic indicators, growth in demand for transport, sectoral activity and energy consumption. Forecasts of GDP growth rates for the period 2005 to 2020 were derived from Portugal's Stability and Growth Programme (2005–2009). The ERT noted that GDP is expected to grow by 32 per cent between 2005 and 2020, while GHG emissions are projected to increase at a much slower pace and to be 8 per cent higher in 2020 than in 2005 under the 'with measures' scenario. This implies a continuation of the lower than GDP growth rate in GHG emissions, a trend which has been observed only since 2005 (see also para. 16 above). In response to a request from the ERT, key assumptions and parameters used in the scenarios were provided by the Party during the review (see table 4). The ERT considered the assumptions plausible and internally consistent, with the exception of the assumed stability in oil price.

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<sup>5</sup> The Integrated MARKAL-EFOM System (TIMES) is an evolved version of MARKAL with new functions and flexibilities. Its main features are described in: Loulou R and Labriet M. 2007. ETSAP-TIAM: the TIMES integrated assessment model Part I: Model structure. *Computational Management Science*. 5. Available at <<http://www.etsap.org/Applications/Global/TIAM%20Results%20for%20Global%20EMF%20Transition%20Scenarios.PDF>>.

Table 4  
**Key assumptions and parameters used for the greenhouse gas emission projections of Portugal**

	<i>Data used for projections</i>			
	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2020</i>
GDP (2000 EUR million)	127 711	138 862	152 435	168 729
Population (thousand)	10 570	10 596	10 538	10 420
International coal prices (EUR/GJ)	2.14	1.65	1.81	1.89
International oil prices (EUR/GJ)	8.52	7.98	8.36	8.75
International gas prices (EUR/GJ)	6.50	5.21	5.65	5.96
Municipal solid waste generation (kt)	3 091	4 944	4 841	4 511
Total forest area (1000 ha)	3 298	3 360	3 444	3 505
GDP from agriculture (2000 EUR million)	3 895	4 299	4 408	4 633
<i>Primary energy consumption by source (PJ)</i>				
Oil	665	485	405	405
Gas	157	149	192	192
Solid fuels	140	135	133	133
Renewable energy sources	120	230	265	265

*Data source:* The Executive Committee of the Climate Change Commission, 2009.

*Abbreviation:* GDP = gross domestic product.

74. **Sensitivity analysis.** In order to consider the main sources of uncertainty associated with the modelling, Portugal provided a detailed sensitivity analysis focusing on the domestic potential for hydropower production (indicated by the Producibile Hydroelectric Index (PHI), with a PHI of 0.0885 as the baseline) and two alternative scenarios for the prices of primary energy. The results suggest that, in the case of low energy prices, a low hydropower production PHI (0.336) should be compensated for by wind power and solar energy in the ‘with additional measures’ scenario, and by wind power in the ‘with measures’ scenario. With low PHI values, the share of RES in TPES falls to 23–29 per cent, compared with 25–34 per cent in the baseline scenario. In contrast, a high availability of hydropower results in an increased share of RES and a decreased share of natural gas and solar power. This scenario results in a 1 per cent increase in the contribution of RES to TPES.

75. In the case of high energy prices, the analysis suggests a reduction in the consumption of natural gas. This implies a reduction in new combined heat and power plants and a reduction in energy consumption in industrial boilers and ovens. On the other hand, the use of fuel oil and biomass increases. Therefore, in the ‘with measures’ scenario, the higher energy price induces a higher consumption of fossil fuels (+10 per cent). The ERT commended Portugal for providing the results of this sensitivity analysis and encourages the Party to also investigate the cost implications of these alternative scenarios.

76. In addition to the ‘with measures’ and ‘with additional measures’ scenarios presented in the NC5, Portugal provided information on two additional scenarios from the 2009 study Clima2020 during the review. These scenarios consider different levels of implementation of PaMs and also differ in terms of their macroeconomic assumptions. The ‘Road Map Renewables’ scenario assumes full implementation of PaMs as foreseen in the revised 2007 revised PNAC, with new targets for RES and the suspended activity of the

coal power plant in the city of Sines. This scenario aims to prove compliance with the European Commission’s proposal of a 31 per cent share of RES in gross final energy consumption. The ‘Quioto Change’ scenario assumes the objectives of the ‘with additional measures’ scenario, but with more optimistic macroeconomic assumptions, such as greater economic growth and success in innovation.

77. The ERT noted that the impact of the global financial and economic crisis (see para. 13 above) was not reflected in the projections in the NC5 and that emission levels during the first commitment period might therefore be lower than projected. Assumptions made with regard to available energy sources and costs, the future development of the demand for energy and its impact on emissions, as well as technological development and electricity imports, were generally found to be in line with recent trends.

**2. Results of projections**

78. Under the ‘with additional measures’ and ‘with measures’ scenarios, total GHG emissions (without LULUCF) in 2010 are projected to be 41.8 and 42.6 per cent above the base year level, respectively (see table 5). According to the NC5, the gap between the ‘with measures’ scenario emission level and the Kyoto Protocol target level will be closed by the following: the implementation of additional PaMs which were not included in the ‘with additional measures’ scenario (3.60 Mt CO<sub>2</sub> eq per year); the new 2007 revised PNAC measures (1.56 Mt CO<sub>2</sub> eq per year; the second national allocation plan under the EU ETS (0.09 Mt CO<sub>2</sub> eq per year); and purchase of Kyoto Protocol units through the Portuguese Carbon Fund (2.88 Mt CO<sub>2</sub> eq per year). However, taking into account a conservative estimate of Portugal’s emissions until 2012, as a result of the implementation of the compliance monitoring system (see paras. 14 and 30 above), the gap is estimated at 3.82 Mt CO<sub>2</sub> eq per year for the compliance period, and the Portuguese Carbon Fund’s current investment target is based on this number (19.1 Mt CO<sub>2</sub> eq for the first commitment period).

79. The ERT noted that harvesting the estimated mitigation effects from new and additional PaMs might become a challenge during the first commitment period, given the limited time available for implementation of these PaMs. On the other hand, GHG emissions have already started to decrease since 2005 (see figure below) and the global economic and financial crisis might bear the potential to further lower this emission trend. The ERT acknowledged that the level of emissions shows significant annual variations (see para. 16 above), which are related to the fluctuations in hydropower generation owing to variation in the level of precipitation. The ERT noted that, during the commitment period, hydrological conditions, hydropower availability and potential forest fires pose an unpredictable risk to meeting the projected emission levels.

Table 5  
**Summary of greenhouse gas emission projections for Portugal**

	<i>Greenhouse gas emissions (Tg CO<sub>2</sub> eq per year)</i>	<i>Changes in relation to base year level (%)</i>
Inventory data 1990 <sup>a</sup>	59.495	1.1
Inventory data 2008	78.664	31.0
Kyoto Protocol base year <sup>b</sup>	60.148	–
Kyoto Protocol target <sup>b</sup>	76.388	27.0
‘With measures’ projections for 2010 <sup>c</sup>	85.796	42.6
‘With additional measures’ projections for 2010 <sup>c</sup>	85.270	41.8

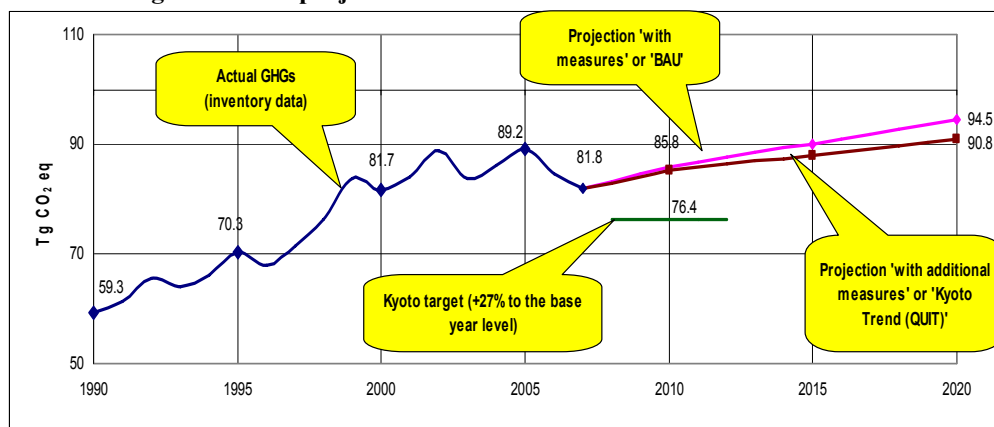
<sup>a</sup> *Data source:* Portugal's 2010 greenhouse gas (GHG) inventory submission; the emissions are without land use, land-use change and forestry (LULUCF).

<sup>b</sup> Based on the initial review report contained in document FCCC/IRR/2007/PRT.

<sup>c</sup> *Data sources:* (1) Portugal's fifth national communication; (2) projections provided by the Party during the in-depth review; the projections are for GHG emissions without LULUCF.

80. In its NC5, Portugal did not present its projections in graphical format. The ERT encourages Portugal to illustrate its projections following the format of figure 1 of the UNFCCC reporting guidelines. Table 5 and the figure below provide a summary of the GHG emission projections for Portugal.

### Greenhouse gas emission projections



*Data sources:* (1) Data for the years 1990–2008: Portugal's 2010 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry (LULUCF). (2) Data for the years 2009–2020: Portugal's fifth national communication; the emissions are without LULUCF.

*Abbreviation:* BAU = business as usual, GHGs = greenhouse gas emissions, QUIT = Kyoto trend scenario.

81. During the period 2010–2020, emission levels are projected to further increase, from 85.8 Mt CO<sub>2</sub> eq to 94.5 Mt CO<sub>2</sub> eq under the 'with measures' scenario, and from 85.3 to 90.8 Mt CO<sub>2</sub> eq under the 'with additional measures' scenario.

82. The ERT noted that total GHG emissions (without LULUCF) are projected to increase by 4–8 per cent during the period 2005–2020, which suggests that Portugal might need to implement additional PaMs if the Party aims to meet its emission reduction goals under the EU climate and energy package for the target year 2020 (see para. 45 above).

83. During the period 2005–2020, emissions of CO<sub>2</sub>, N<sub>2</sub>O and fluorinated gases are projected to increase by 2.3–5.6 per cent, 44.4 per cent and 174.7–359.7 per cent, respectively, while emissions from CH<sub>4</sub> are projected to decrease by 28.4–28.9 per cent.

84. The ERT noted some differences between various presentations of the projected data, and recommends that Portugal ensure the internal consistency of the data presented in its next national communication.

### 3. Total effect of policies and measures

85. In the NC5, Portugal did not provide an estimate of the total effect of implemented and adopted PaMs, in accordance with the 'with measures' scenario, compared with a situation without such PaMs. The GHG emission reduction potential of additional measures included in the 'with additional measures' scenario was estimated at 3.69 Mt CO<sub>2</sub> eq per year. Additional PaMs included in the 2007 revised PNAC (see para. 42 above) were estimated to provide further reductions in GHG emissions of 1.56 Mt CO<sub>2</sub> eq per year. Table 6 provides an overview of the total effect of PaMs as reported by Portugal.

Table 6  
**Projected effects of planned, implemented and adopted policies and measures in 2010**

<i>Sector</i>	<i>Effect of implemented and adopted measures (Mt CO<sub>2</sub> eq)</i>	<i>Relative value (% of base year emissions)</i>	<i>Effect of planned measures (Mt CO<sub>2</sub> eq)</i>	<i>Relative value (% of base year emissions)</i>
Energy (without CO <sub>2</sub> from transport)	NA	NA	NA	NA
Transport – CO <sub>2</sub>	NA	NA	1.05	
Industrial processes	NA	NA	1.69	
Agriculture	NA	NA	NA	NA
Land-use change and forestry	NA	NA	NA	NA
Waste management	NA	NA	NA	NA
<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>3.69</b>	<b>NA</b>

*Data source:* Portugal's fifth national communication.

*Abbreviation:* NA = not available.

*Note:* The total effect of planned policies and measures is defined as the difference between the 'with measures' and 'with additional measures' scenarios.

86. For 2020, the effect of planned PaMs can be calculated by taking the difference between the 'with measures' and 'with additional measures' scenarios as provided in the NC5. These projections suggest that the implementation of the planned PaMs can reduce GHG emissions by an additional 4 per cent or 3.71 Mt CO<sub>2</sub> eq by 2020.

87. The energy sector is expected to continue to contribute a large share of the emissions, responsible for 69.4 Mt CO<sub>2</sub> eq and 67.1 Mt CO<sub>2</sub> eq in the 'with measures' and 'with additional measures' scenarios, respectively.

88. Emissions from the energy sector are projected to increase (by 12–15 per cent from 2005 levels), whereas significant emission reductions are projected to be achieved in the waste sector (–26 per cent from 2005 levels) and agriculture sector (–1 per cent from 2005 levels) by 2020. Emissions from the transport and industry sectors are projected to increase during the period 2005–2020 by 8–12 per cent and 19–30 per cent, respectively, while emissions from the residential and commercial sectors are projected to decrease by 1 per cent. The ERT noted that projections of emissions and removals for the LULUCF sector were not presented for 2015 and 2020, and recommends that Portugal present such projections in its next national communication, in line with the UNFCCC reporting guidelines.

89. Section 3.9 of the NC5 contains a comparison of the historic (1990–2007) growth in emissions with the linear "target path to Kyoto". According to this information, in 2007, Portugal's GHG emissions were 7 per cent above this target path. The ERT noted, however, that Portugal presented additional information on its new energy strategy, which implements the 2008 EU climate and energy package, during the review. The ERT further noted that the strategy is in line with the scenarios and projections provided in the NC5. The additional 'Quioto Change' scenario presented during the review is in line with and meets Portugal's EU-2020 targets and shows that the Party could achieve its objectives with some additional investment and measures.

90. In order to increase the transparency, consistency and completeness of its reporting, the ERT recommends that Portugal provide, in its next national communication, an estimate

of the total effect of its adopted and implemented PaMs by gas and by sector for the years 2005, 2010, 2015 and 2020 in tabular format, as required by the UNFCCC reporting guidelines. Portugal’s next national communication should also include an estimate of the total effect of its PaMs, in accordance with the ‘with measures’ scenario definition, compared with a situation without such PaMs, presented in terms of GHG emissions avoided or sequestered, by gas (on a CO<sub>2</sub> eq basis), in 1995 and 2000.

**4. Supplementary relating to mechanisms pursuant to Article 6, 12 and 17**

91. Portugal, in its NC5 (section 3.7), provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. In order to meet the emission limitation target defined in the context of the Kyoto Protocol and the EU burden-sharing agreement, Portugal has focused on implementing PaMs domestically, making use of the Kyoto Protocol market mechanisms in a supplementary way. The ERT noted that the envisaged purchase of Kyoto Protocol units of 3.82 Mt CO<sub>2</sub> eq per year corresponds to the magnitude of aggregated total effect of adopted, planned and new PaMs (see para. 85 above).

92. The current planned investment target of the Portuguese Carbon Fund is set at 19.1–22.2 Mt CO<sub>2</sub> eq for the first commitment period, it is estimated that this amount will be needed to fill in the gap to the Kyoto Protocol target, there are some risks associated with this estimate (see paras. 78–79 above). The Carbon Fund has committed investments worth EUR 125 million, including EUR 29 million fully disbursed to the Luso Carbon Fund (Banif Asset Management), EUR 11.70 million in the Carbon Fund for Europe (World Bank/European Investment Bank), EUR 10.23 million in the Asia-Pacific Carbon Fund (Asian Development Bank) and EUR 22.80 million in the Natsource Carbon Asset Pool. With its investments in these funds, the Carbon Fund expects to acquire 6.50 million Kyoto Protocol units. This investment also includes the purchased 4 million assigned amount units and 0.28 million certified emission reductions in the secondary market. Based on the NC5 projections and investment plan of the Portuguese Carbon Fund, the ERT concluded that Portugal is likely to meet its target under Article 3 of the Kyoto Protocol.

**D. Vulnerability assessment, climate change impacts and adaptation measures**

93. In its NC5, Portugal has provided the required information on the expected impacts of climate change in the country and on vulnerability assessment. Portugal also provided information on adaptation measures and actions taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation in the coastal zones, water resources and agriculture sectors. Table 7 summarizes the information on vulnerability and adaptation to climate change presented in the NC5.

Table 7

**Summary of information on vulnerability and adaptation to climate change**

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Agriculture	<p><b>Vulnerability:</b> Reduction in the yield of irrigated crops; regional variations in agricultural productivity; increase in air temperature, accompanied by a decrease in annual rainfall; increase in diseases and pests</p> <p><b>Adaptation:</b> Management plan which takes into account the region/crop/climate/soil/cultivation practices under the foreseen climate change scenarios; improvement and selection of culture varieties more adapted to the low water availability; better soil mobilization and</p>

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
	irrigation technology
Biodiversity and natural ecosystems	<b>Vulnerability:</b> Risk of damage to soil constitution; difficulty of maintaining water cycle; difficulty of flood control and climate regulation <b>Adaptation:</b> Increase of resilience of ecosystems
Coastal zones	<b>Vulnerability:</b> Increased erosion, leading to increase in flooded areas; reduction in waste deposition; <b>Adaptation:</b> Coastal zone management plans
Fisheries	<b>Vulnerability:</b> Risk of change in temperature and acidity of seawater; increase in invasion of exotic species; risk of biotoxin contamination <b>Adaptation:</b> Precautionary management of resources
Forests and biodiversity	<b>Vulnerability:</b> Significant increase in the risk of fire hazards; increase in impact of storms, floods, droughts and heatwaves <b>Adaptation:</b> Public awareness campaigns, better forestry techniques; substitution of tree species; soil conservation; increase of plantation zones; maintenance of ecosystems in order to improve productive capacity, vitality and well-being of villages
Human health	<b>Vulnerability:</b> Changes in the dynamics of the transmission of infectious diseases; increase in heatwaves; lengthening of periods of drought; increase in intensity of precipitation; exposure to natural toxins <b>Adaptation:</b> Contingency plan for reduction of effects of heatwaves; systems to prevent diseases
Infrastructure and economy	<b>Vulnerability:</b> In the energy sector, high demand for air conditioning and refrigeration, and reduction in production of renewable energy sources and forest biomass; damage to industrial infrastructure <b>Adaptation:</b> Monitoring of energy infrastructure; reconstruction of buildings, roads and electrical grid
Water resources	<b>Vulnerability:</b> Changes in the quality and availability of water; change in the seasonal and national distribution of hydrological resources; increase in the magnitude and frequency of floods and droughts; degradation of river ecosystems <b>Adaptation:</b> National Adaptation Strategy; water demand management

94. In the context of the Scenarios, Impacts and Adaptation Measures (SIAM) I and II projects, a number of studies were carried out on the vulnerability of domestic hydrological resources, coastal areas, energy, forests and biodiversity, fishing and agriculture, and health. Adaptation measures were developed for the water sector. The SIAM I examined mainland Portugal; SIAM II extended the study to the autonomous regions of the Azores and Madeira.

95. Building on the SIAM I and II projects, Portugal launched a new National Strategy for Climate Change Adaptation in 2008. This strategy is mainly programmatic, defining the guidelines for action for the next years, and being periodically updated and defined within the various sectors by the public administration and other stakeholders. The strategy is seen to be a first step in preparing Portugal for the challenges of adapting to a changing climate.

96. The ERT commended Portugal for its work in the field of impact and vulnerability assessment and encourages Portugal to provide, in its next national communication, an



overview of its adaptation measures adopted and/or planned in the identified vulnerable areas. The ERT further encourages the Party to clearly identify the climate change adaptation measures for the autonomous regions of the Azores and Madeira.

97. The NC5 does not provide information on cooperation with developing countries in preparing for adaptation. During the review, the ERT was provided with an overview of the projects led by Portuguese enterprises in many African countries affected by drought and desertification or floods. The ERT encourages the Party to include information on these activities in its next national communication.

98. Finally, the ERT encourages the Party to also incorporate in its next national communication additional information on the strengthened linkages between CECAC and representatives of the autonomous regions of the Azores and Madeira on matters related to adaptation.

## **E. Financial resources and transfer of technology, including information under Articles 10 and 11 of the Kyoto Protocol**

### **1. Provision of financial resources, including “new and additional” resources and resources under Article 11 of the Kyoto Protocol**

99. The information provided in the NC5 covers most of the issues on which information is required under the Convention and its Kyoto Protocol. In its NC5, Portugal provided details of measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention and under Article 11 of the Kyoto Protocol. In particular, it provided information on financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels, including the Global Environment Facility, as well as information on the assistance provided to developing country Parties to help them in funding adaptation measures. However, the ERT noted that the Party did not provide the following reporting elements required by the UNFCCC reporting guidelines: an indication of what “new and additional” financial resources it has provided pursuant to Article 4, paragraph 3; and clarification of how it has determined such resources as being “new and additional”. The ERT recommends that Portugal enhance the completeness and transparency of its reporting by including such information in its next national communication.

100. Portugal’s official development assistance (ODA) is defined within the framework of its International Development Agenda and in accordance with successive commitments undertaken in various international forums. The Party also aims to implement, in a coherent, effective and up-to-date manner, a strategic cooperation framework in which the fight against poverty, inequity and social exclusion in developing countries is high priority. Despite having reaffirmed its commitment to the pledges made in the context of global efforts to achieve the United Nations Millennium Development Goals, Portugal has faced serious difficulties in increasing its ODA. Most aid is channelled bilaterally – an average of 61 per cent of total ODA, from 2002 to 2007.

101. The ERT noted that the 2005 Strategy on Portuguese Development Cooperation does not provide priority areas in relation to climate change. However, during the review, the Party informed the ERT that a new document is being prepared which considers climate change a priority in bilateral and multilateral cooperation. The ERT welcomed these plans.

102. With regard to “new and additional” financial resources provided by Portugal pursuant to Article 4, paragraph 3, host-country representatives explained that Portugal had created funds that it considers “new and additional” in 2005 (see table 8 below). However, the ERT noted the lack of transparency in the NC5 as to how such resources had been

determined as “new and additional”. The ERT recommends that the Party provide transparent information on how it determined these funds as being “new and additional” in its next national communication. Table 8 summarizes information on financial resources and technology transfer.

Table 8

**Summary of information on financial resources and technology transfer for 2005–2007**

<i>Channel of financial resources</i>	<i>Years of disbursement</i>		
	<i>2005</i>	<i>2006</i>	<i>2007</i>
Official development assistance (ODA) (EUR million) <sup>a</sup>	303 <sup>b</sup>	396	344
Climate-related aid in bilateral ODA (EUR) <sup>c</sup>	138 146	567 855	232 731
Climate-related support programmes (EUR) <sup>d</sup>	1 690 282	886 218	1 461 289
Contributions to GEF (USD million) <sup>e</sup>	1.9	1.7	3.2
Pledge for GEF replenishment (USD million) <sup>f</sup>	1.8	0.0	3.9
JI and CDM under the Kyoto Protocol (EUR)	NA	NA	5 284 953
Other (multilateral) (USD million) <sup>g</sup>	160	185	200

<sup>a</sup> Source: NC5 table 47 – Portuguese ODA disbursed between 2004 and 2007.

<sup>b</sup> Source:

<[http://www.ipad.mne.gov.pt/index.php?option=com\\_content&task=view&id=200&Itemid=220](http://www.ipad.mne.gov.pt/index.php?option=com_content&task=view&id=200&Itemid=220)>.

<sup>c</sup> Source: NC5 table 49 – Bilateral (both mitigation and adaptation) – Bonn Political Declaration.

<sup>d</sup> Source: NC5 table 49 – Total Bonn Political Declaration, including bilateral ODA figures.

<sup>e</sup> Source: NC5 table 51 – Financial contributions to the GEF – disbursements.

<sup>f</sup> Source: NC5 table 51 – Financial contributions to the GEF – commitments.

<sup>g</sup> Source: NC5 table 50 – Portugal’s multilateral contributions 2001–2007, including GEF contributions.

*Abbreviations:* CDM = clean development mechanism, GEF = Global Environment Facility, JI = joint implementation. NA= not applicable, NC5 = Portugal’s fifth national communication.

## 2. Activities related to transfer of technology, including information under Article 10 of the Kyoto Protocol

103. In its NC5, Portugal has provided details of measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies. It also reported activities related to technology transfer, and its activities for financing access by developing countries to ‘hard’ or ‘soft’ environmentally sound technologies. Furthermore, Portugal has reported in textual format on steps taken by the government to promote, facilitate and finance transfer of technology, and to support development and enhancement of endogenous capacities and technologies of developing countries. However, the ERT noted that Portugal did not make a clear distinction between activities undertaken by the public sector and those undertaken by the private sector. The ERT recommends that Portugal include this information in its next national communication.

104. In its NC5, Portugal has reported that technology transfer was provided by the Party in several projects supported by Portuguese ODA between 2001 and 2005. With the objective of mainstreaming considerations related to the environment and climate change,

Portugal has been focusing its support on technologies that allow for a more rational use of resources, particularly water and energy.

## **F. Research and systematic observation**

105. Chapter 7 of Portugal's NC5 provides information on its actions relating to research and systematic observation. However, in reviewing Portugal's NC5, the ERT identified the following problem: the information on research that Portugal provided in its NC5 and its responses to related questions raised by the ERT during the review indicate that Portugal's NC5 is not transparent, as it does not provide any information on research carried out since the publication of Portugal's NC4. The ERT identified this lack of transparency as a potential problem in accordance with paragraph 137(a) of the annex to decision 22/CMP.1.

106. In response to this potential problem raised by the ERT, the Party resubmitted its NC5 on 11 June 2010. The ERT noted that the resubmitted NC5 contains a revised section on research, which was found to be complete, consistent with the UNFCCC reporting guidelines and transparent. Portugal provided information on both domestic and international activities, including participation in the IPCC, EU regional projects aimed at cooperative action in relation to remote sensing and climate observation, the World Climate Programme and its research component, the International Geosphere–Biosphere Programme and the Global Climate Observing System. The ERT noted that Portugal participates in the Ocean Climate Observing System (OCOS) but not in the Global Terrestrial Observing System. The NC5 also reflects action taken to support related capacity-building in developing countries, mainly in the Portuguese-speaking countries.

107. With regard to activities in the field of systematic observation, Portugal provided updated information on the capacity of the OCOS network in its revised NC5. The ERT acknowledged the Party's efforts to improve the quality and coverage of the meteorological observation network. The ERT encourages Portugal to give higher priority to this important matter by increasing financial provisions for the strengthening of institutional and technical capacity at the national level, and to take into account the suggestions made by the previous ERT during the in-depth review of the NC4.

108. The ERT commended the efforts of Portugal to increase support for research and development overall, and in the area of climate change in particular. The ERT acknowledged the capacity of national research institutions working in the field of climate change and an increasing number of national research studies on adaptation and mitigation. The ERT encourages Portugal to enhance its research activities in the areas of climate change vulnerability and impact assessment. The ERT also encourages Portugal to proactively participate in international research networks in order to highlight the innovative nature and results of Portuguese research activities.

## **G. Education, training and public awareness**

109. In the NC5, Portugal has provided information on its actions relating to education, training and public awareness, reporting a range of activities at the national, regional and local levels. Portugal also informed the ERT about additional activities, such as new PhD programmes on climate and development, and awareness-raising activities carried out by the private sector, during the review.

110. Climate change and other environmental issues are of a cross-cutting nature and are present in school curricula. In the current reorganization of the curriculum for primary education and the revision of that for secondary education, these issues are specifically covered in some subjects.

111. Since 1997, within the scope of the Ministry of Education (ME) and MAOT Cooperation Project (signed in 1996), teachers have been appointed to coordinate school projects for environmental education. Other projects on environmental education have been developed in schools, coordinated by ME in partnership with MAOT, the municipalities and universities and with the participation of the other governmental institutions and non-governmental organizations (NGOs). For example, the educational project entitled “O ambiente é de todos – vamos usar bem a energia” (Environment belongs to all – let’s use energy well) aimed at students in the second and third grades, addressed the topics of energy efficiency and climate change. Between 2006 and 2008, more than 325,000 students and 46,500 teachers were involved in this project.

112. Environmental NGOs play a very active role in processes involving public participation, while also having an equally important role in raising awareness of environmental problems. Portugal has supported the participation of representatives of environmental NGOs at various national and international events, including the Conferences of the Parties, in order to increase the capacity of the benefiting entities. The ERT encourages the Party to focus, in its next national communication, on information on education, training and public awareness that relates to climate change specifically.

**H. Evaluation of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol**

113. Portugal has provided all of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC5. The supplementary information is placed in different sections of the NC5. Table 9 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol, as well as references to the NC5 chapters in which this information is provided. The technical assessment of this information reported under Article 7, paragraph 2, is included in different sections of this report.

Table 9

**Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol**

<i>Supplementary information</i>	<i>Reference</i>
National registry	NC5, chapter 3.14
National system	NC5, chapter 2.1
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	NC5, chapters 3.7 and 3.13
Policies and measures in accordance with Article 2	NC5, chapter 3
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	NC5, chapter 3.10
Information under Article 10	NC5, chapters 2.1, 3, 5, 6.4, 7 and 8
Financial resources	NC5, chapter 6

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

114. Portugal reported the information requested in section H. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the annex to decision 15/CMP.1 as a part of its 2010 annual submission. During the in-country review, Portugal provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the reported information to be mostly complete and transparent. The ERT encourages the Party to continue exploring and reporting on the adverse impacts of the response measures, in accordance with paragraphs 23–25 of the annex to decision 15/CMP.1.

115. The Party's 2010 national inventory report and the additional information provided during the review presented several initiatives of Portugal aiming to minimize adverse impacts, including the implementation of the Kyoto Protocol and its economy-wide approach covering all sectors. As such, the PaMs implemented, adopted or foreseen in PNAC, targeting the six GHGs of the Kyoto Protocol through the Party's broad portfolio of instruments and wide-ranging coverage of all sectors of the economy, constitute a significant effort by the Party to address climate change, including the minimization of the adverse effects of such policies. In some cases, such as measures pertaining to the diversification of primary energy sources (e.g. shifting to natural gas), co-benefits for both Portugal's emission reductions and the economies of fossil fuel exporting countries are expected. Portugal's energy policy is directed towards achieving energy security by diversifying sources of fossil fuel supply and increasing endogenous resources.

## **III. Conclusions and recommendations**

116. The ERT concludes that the NC5 provides a good overview of the national climate policy of Portugal. The information provided in the NC5 includes most mandatory information required by the UNFCCC reporting guidance and all elements of the supplementary information under Article 7 of the Kyoto Protocol. During the review, Portugal provided additional information on research and financial resources as well as on minimization of adverse effects and impacts.

117. Portugal's total GHG emissions for 2008 were estimated to be 32.2 per cent above its 1990 level, excluding LULUCF, and 18.3 per cent above, including LULUCF. Emission increases were driven by growth in overall economic activity and road transport. Major forest fires in 2003 and 2005 had a considerable impact on the overall GHG emission trend, as they led to significant increases in emissions in these two years from the LULUCF sector. A decrease in total GHG emissions since 2005 can be observed, which is largely due to an increase in the use of RES, mainly hydropower and wind power. The ERT noted that as a result, GHG emissions began to decouple from economic growth.

118. In the NC5, Portugal has presented GHG projections for the period from 1990 to 2020. Two scenarios are included: 'with measures' and 'with additional measures'. Under these scenarios, total GHG emissions without LULUCF in 2010 are projected to be 41.8 and 42.6 per cent above the base year level, respectively. Thus, the projections indicate that Portugal does not expect to meet its Kyoto Protocol target (which is to limit the growth in its GHG emissions to 27 per cent in relation to the base year level during the first commitment period 2008–2012) through domestic action only. Host-country representatives expect the Portuguese Carbon Fund to cover most of the remaining gap of 3.11–3.82 Mt CO<sub>2</sub> eq per year.

119. The NC5 contains information on how the Party's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. The ERT noted that the envisaged purchase of Kyoto Protocol units corresponds to the magnitude of aggregated total effects of adopted, planned and new PaMs (see para. 85 above).

120. The ERT acknowledged the efforts made by Portugal to develop and implement policies, measures and instruments to deliver on its commitment to limit its GHG emissions. In the context of PNAC, a total of 44 PaMs were proposed in the different sectors (energy, transport, agriculture, forestry and waste) to address the increase in emissions. The ERT noted that new targets had been introduced since the NC4, such as a 10 per cent biofuel content in transport fuels by 2010 and the targets of NNESS2020. Among the EU-wide policies that are implemented in Portugal, the EU ETS plays a fundamental role in reducing Portugal's GHG emissions. The ERT further noted that a number of the PaMs are innovative (e.g. support of electric vehicles, RES and energy efficiency in residential buildings). The ERT noted that, while a number of Portugal's PaMs are innovative, the estimated overall mitigation effect is very ambitious, and meeting the overall objective could be a challenge, given the uncertainty in economic and fiscal development, as well as the rate of technology penetration.

121. During the review, the Party provided information on new and updated PaMs, such as those contained in the NNESS2020. The main objectives of the strategy up to 2020 are to reduce the dependence on energy imports from 83.3 per cent (in 2008) to 74.0 per cent, to increase the share of energy from RES in gross final energy consumption to 31 per cent, to increase the share of electricity produced from RES in total electricity production to 60 per cent, and to reduce final energy consumption by 20 per cent.

122. Portugal provides financial resources in the context of its ODA, which is defined within the framework of the International Development Agenda, and in accordance with successive commitments undertaken in various international forums. Despite having reaffirmed its commitment to the pledges made in the context of global efforts to achieve the Millennium Development Goals, Portugal has faced serious difficulties in increasing its ODA. The ERT noted that the 2005 Strategy on Portuguese Development Cooperation does not provide priority areas in relation to climate change.

123. In 2008 Portugal put in place a new National Strategy for Climate Change Adaptation. The analysis of expected impacts of climate change and vulnerability assessment suggests that Portugal may wish to give priority to coastal zones management, water resources and adaptation in agriculture. In the context of the SIAM projects, further studies were carried out that comprehensively cover the assessment of vulnerability of practically all sectors, such as domestic hydrological resources, coastal areas, energy, forests and biodiversity, fishing and agriculture, and health.

124. The ERT commended the efforts of Portugal to increase the funding for research and development overall, and in the area of climate change in particular. The ERT acknowledged the capacity of national research institutions working in the field of climate change and the increasing number of national research studies on adaptation and mitigation. The ERT encourages Portugal to proactively participate in international research networks in order to highlight the innovative nature of Portuguese research activities.

125. The ERT concluded that Portugal's national system continues to perform its required functions as set out in decision 19/CMP.1; and that the national registry continues to perform the functions set out in decisions 13/CMP.1 and 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

126. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol provided by the Party in its 2009 and 2010 annual submissions was found to be mostly complete and transparent. The ERT encourages Portugal to further enhance the reporting on Article 3, paragraph 14, including by indicating the prioritization of the action taken in implementing its commitments under Article 3.

127. In the course of the IDR, the ERT formulated several recommendations relating to the completeness and transparency of Portugal's reporting under the Convention and its Kyoto Protocol. The key recommendations<sup>6</sup> are that Portugal:

(a) Improve the completeness of its reporting by including in its next national communication the following information:

(i) Provide projections of emissions related to fuel sold to ships and aircraft engaged in international transport, and projection of emissions and removals for the LULUCF sector;

(ii) Provide an estimate of the total effect of its adopted and implemented PaMs by gas and by sector for the years 2005, 2010, 2015 and 2020 in tabular format, as required by the UNFCCC reporting guidelines;

(b) Improve the transparency of its reporting by:

(i) Provide further information on the minimization of adverse effects/impacts in accordance with Article 2, paragraph 3, and Article 3, paragraph 14, of the Kyoto Protocol;

(ii) Provide additional information on marine and aviation bunkers;

(iii) Provide more detailed information on financial resources and technology transfer, for example on how it determined its financial resources as being "new and additional";

(iv) Ensure the internal consistency of the data presented.

128. The ERT encourages Portugal to undertake a number of improvements regarding the transparency and completeness of its reporting; the most important of these are that the Party:

(a) Provide a table with information on the costs of implementation of its PaMs;

(b) Provide more detailed information on the monitoring method for tracking emission reductions that has been developed in Portugal;

(c) Elaborate on the main differences in assumptions, methods and approaches used in the GHG emission projections between the NC5 and its next national communication;

(d) Illustrate its projections in graphical format, following the format of figure 1 of the UNFCCC reporting guidelines;

(e) Identify clearly the climate change adaptation measures for the autonomous regions of the Azores and Madeira, and incorporate in its next national communication additional information on the strengthened linkages between CECAC and representatives of these autonomous regions;

(f) Proactively participate in international research networks in order to highlight the innovative nature and results of Portuguese research activities.

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<sup>6</sup> The recommendations are given in full in the relevant sections of this report.

#### **IV. Questions of implementation**

129. During the review, the ERT assessed the NC5, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, and reviewed information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, with regard to timeliness, completeness and transparency. No question of implementation was raised by the ERT during the review.



## Annex

### Documents and information used during the review

#### A. Reference documents

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”. FCCC/CP/1999/7. Available at <<http://unfccc.int/resource/docs/cop5/07.pdf>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/CP/1999/7. Available at <<http://unfccc.int/resource/docs/cop5/07.pdf>>.

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

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

FCCC/SBI/2007/INF.6. Compilation and synthesis of fourth national communications. Available at <<http://unfccc.int/resource/docs/2007/sbi/eng/inf06.pdf>>.

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2009 greenhouse gas inventory submission of Portugal. Available at <[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/4771.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php)>.

2010 greenhouse gas inventory submission of Portugal. Available at <[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/5270.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php)>.

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

Responses to questions during the review were received from Mr. Eduardo Santos (Ministry of Environment and Spatial Planning), including additional material on updated policies and measures, greenhouse gas projections, the national registry, research, and recent climate policy developments in Portugal. The following documents<sup>1</sup> were also provided by Portugal:

The Portuguese Adaptation Strategy to the Impacts of Climate Change on Water Resource - project funded by the Water's National Institute (INAG) (to be published in 2011).

2001 National Strategy on Climate Change: Resolução do Conselho de Ministros n.º 59/2001, de 10 de Maio. Available at: <[http://www.igf.min-financas.pt/inflegal/bd\\_igf/bd\\_legis\\_geral/Leg\\_geral\\_docs/RCM\\_059\\_2001.htm](http://www.igf.min-financas.pt/inflegal/bd_igf/bd_legis_geral/Leg_geral_docs/RCM_059_2001.htm)>.

New National Energy Strategy 2020 (NNE2020): Resolução do Conselho de Ministros n.º 29/2010, de 15 de Abril. Available at: <[http://www.portugal.gov.pt/pt/GC18/Governo/Ministerios/MEI/ProgramaseDossiers/Pages/20100415\\_MEID\\_Prog\\_ENE2020.aspx](http://www.portugal.gov.pt/pt/GC18/Governo/Ministerios/MEI/ProgramaseDossiers/Pages/20100415_MEID_Prog_ENE2020.aspx)>.

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F.D. Santos e P. Miranda (editors) (2006): Climate Change in Portugal: Scenarios, Impacts and Adptation Measures – Project SIAM II. Lisbon, Gradiva.

CLIMAAT (2007): Associação para o Estudo do Ambiente Insular - Observatório do Ambiente dos Açores (2007). Clima e Meteorología dos Arquipélagos Atlânticos - Clima Marítimo e Costeiro. Angra do Heroísmo. Available at: <<http://www.climaat.angra.uac.pt>>.

EN AAC: Resolução do Conselho de Ministros n.º 24/2010, de 1 de Abril. Available at: <[http://www.maotdr.gov.pt/pt/GC18/Governo/Ministerios/MAOTDR/Documentos/Pages/20100401\\_MAOT\\_Doc\\_Estrategia\\_Alteracoes\\_Climaticas.aspx](http://www.maotdr.gov.pt/pt/GC18/Governo/Ministerios/MAOTDR/Documentos/Pages/20100401_MAOT_Doc_Estrategia_Alteracoes_Climaticas.aspx)>.

CECAC and APA (2008). Portugal Clima 2020: Avaliação do Impacto da Proposta Energia-Clima da Comissão Europeia para Portugal. Lisboa. Available at: <[http://www.maotdr.gov.pt/Admin/Files/Documents/PORTUGAL%20CLIMA%202020\\_VersaoEditada\\_FINAL\\_27Junho.doc](http://www.maotdr.gov.pt/Admin/Files/Documents/PORTUGAL%20CLIMA%202020_VersaoEditada_FINAL_27Junho.doc)>.

CECAC (2010): Monitoring System on the implementation of national policies and measures. Available at: <<http://www.cumprirquioto.pt>>.

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<sup>1</sup> Reproduced as received from the Party.