COMPLIANCE COMMITTEE **CC/ERT/2012/6**
7 September 2012

Report of the in-depth review of the fifth national communication of the European Union

Note by the secretariat

The report of the in-depth review of the fifth national communication of the European Union was published on 4 September 2012. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/IDR.5/EU, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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Framework Convention on Climate Change

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Report of the in-depth review of the fifth national communication of the European Union

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 the European Union 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 the European Union (EU) the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Under the Kyoto Protocol, 15 member States of the EU (EU-15)[1] committed themselves to reducing their greenhouse gas (GHG) emissions by 8 per cent compared with the base year[2] level during the first commitment period from 2008 to 2012.[3] The EU is a regional economic integration organization to which its member States have transferred part of their sovereign powers including in the field of climate change. Since 2007, the EU consists of 27 member States (EU-27).[4]

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of the EU-27, but focuses on the EU-15 unless specified otherwise. The IDR was 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 23 to 28 April 2012 in Brussels, Belgium, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Ms. Amrita Narayan Achanta (India), Ms. Diann Black-Layne (Antigua and Barbuda), Ms. Julie Gilfeld (Australia), Ms. Kate Larsen (United States of America) and Mr. Brian Mantlana (South Africa). Ms. Black-Layne and Ms. Larsen were the lead reviewers. The review was coordinated by Ms. Ruta Bubniene and Ms. Sylvie Marchand (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 the EU 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 the EU in its 2011 and 2012[5] annual submissions 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 EU, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

[1] The 15 member States that formed the European Community (EU-15) at the time of ratification of the Kyoto Protocol are as follows: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for carbon dioxide, methane and nitrous oxide for all member States; 1990 is the base year for perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride for three member States (Austria, France, Italy), and 1995 for the 12 remaining member States (Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom). The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

[3] The European Community and its 15 member States agreed to fulfil their commitments under Article 3, paragraph 1, of the Kyoto Protocol, jointly and in accordance with Article 4 of the Kyoto Protocol (see FCCC/CP/2002/2). While the European Community is the signatory of the Convention, the EU is the legal entity representing the constituent member States, in accordance with the Lisbon Treaty of 2009.

[4] The 27 member States of the EU (EU-27) include the EU-15 and the following countries: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. The EU-27 does not have a collective target under the Kyoto Protocol.

[5] The EU-15 2012 annual submission, v. 1.2, of 25 May 2012.

B. Summary

5. The ERT noted that the NC5 of the EU complies mostly 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[6] is provided in the NC5. In its NC5, the EU considered most recommendations provided in the report of the centralized in-depth review of the fourth communication of the European Community (IDR NC4).[7] The ERT commended the EU for its improved reporting.

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

7. The coverage of the NC5 extends to information at the EU level, except for GHG inventory data and projections, which are a compilation of the data from individual member States. Hereinafter in the report, the data used refer to the EU-15, if not specified otherwise. Policies and measures (PaMs) presented in the report refer to the EU-wide programmes, strategies and legislation and do not include member States' PaMs, which are reported in the national communications of these Parties.

1. Completeness

8. The NC5 covers all sections required by the UNFCCC reporting guidelines and all supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. The NC5 does not include some information required by the UNFCCC reporting guidelines, namely: the total effect of PaMs for 1995, 2000 and 2005 and the total effect of PaMs by sector; and an explicit definition of "new and additional" financial resources. During the review, the EU provided to the ERT the missing information or explained the challenges it faced in providing this information (see paras. 34, 100 and 115 below). The ERT recommends that the EU enhance the completeness of its reporting by providing this information in its next national communication.

2. Transparency

9. The ERT acknowledged that the NC5 of the EU, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, is broadly transparent. The NC5 provides clear information on all aspects of implementation of the Convention and its Kyoto Protocol and supplementary information submitted under Article 7, paragraph 2, of the Kyoto Protocol, is easily identifiable. In the course of the review, the ERT formulated a number of suggestions that could help the EU to further increase the transparency of its reporting with regard to national circumstances (see para. 24 below) PaMs (see paras. 34, 43 and 45 below), projections and total effects of PaMs (see paras. 41, 85, 87 and 100 below), vulnerability assessment, climate change impacts and adaptation (see paras. 110 and 112 below), financial resources and technology transfer (see paras. 122 and 123 below), research and systematic observation (see para. 134 below) and information on minimization of adverse impacts (see para. 145 below).

3. Timeliness

10. The NC5 was submitted on 7 December 2009 before the deadline of 1 January 2010 mandated by decision 10/CP.13. The ERT noted the limited lapse of time between the IDR

[6] Decision 15/CMP.1, annex, chapter II.
[7] FCCC/IDR.4/EC.

(11–16 May 2009) of the fourth national communication (NC4) and the NC5 submission which prevented the EU from considering all the recommendations of the IDR NC4.

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, the EU has provided a reasonably concise description of its national circumstances, elaborated on the framework legislations and key policy documents on climate change. The NC5 also referred to the description of a national system provided in the national inventory report of the 2009 annual submission. Further technical assessment of the institutional and legislative arrangements for coordination and implementation of PaMs are provided in chapter II.B of this report.

1. National circumstances

12. In its NC5, the EU has provided a description of its national circumstances, and information on how these national circumstances affect GHG emissions and removals in the EU and how changes in national circumstances affect GHG emissions and removals over time. Information was provided on the population, geography, climate, economy and relevant economic sectors, and limited information on the institutional structure. During the review, in response to the ERT request, the EU provided further information on the administrative structure and policymaking process of the EU. Table 1 illustrates the national circumstances of the Party by providing some indicators relevant to GHG emissions and removals.

13. The EU is a regional economic integration organization, to which its member States have transferred part of their sovereign powers for policymaking, including in the field of climate change, to the European Council and the European Parliament. The diversity of national circumstances (economic, social, environmental) in both the EU-15 and the EU-27 and the complex EU-wide policymaking process (see para. 14 below) make it necessary to apply flexible approaches in framing climate change policy at the EU level.

14. The European Commission (EC) is the executive body of the EU. It ensures the application of the Treaties and of measures adopted by the institutions pursuant to them. It also oversees the application of Union law under the control of the Court of Justice of the EU. The EC, the Council and the European Parliament are the institutions that develop the EU policies and laws through ordinary legislative procedure, which starts with the proposal by the EC and ends with the adoption of a common decision by the Council and the Parliament. The complex decision-making procedure involves a Directorate General (DG) responsible for certain matters making a proposal, other relevant DGs commenting on it through inter-service consultations and the College (comprising all Commissioners) adopting the final proposal. The proposals are prepared by the EC following the participatory principle. The Climate Change Committee established under the monitoring

mechanism decision[8] (MMD) contains four working groups,[9] with membership of technical experts from the member States.

Table 1
Indicators relevant to greenhouse gas emissions and removals for the EU-15, 1990–2010

	1990	*1995*	*2000*	*2005*	*2008*	*2009*	*2010*	*Change 1990–2000 (%)*	*Change 2000–2010 (%)*	*Change 1990–2010 (%)*
Population (million)	366.02	372.73	377.97	388.67	395.38	397.00	398.02	3.3	5.3	8.7
GDP (2000 USD billion using PPP)	7 628.43	8 271.54	9 549.82	10 389.24	11 026.83	10 555.49	10738.68	25.1	12.4	40.8
TPES (Mtoe)	1 301.13	1 356.45	1 433.05	1 509.05	1 474.57	1 398.73	1447.22	10.1	1.0	11.2
GDP per capita (2000 USD thousand using PPP)	20.84	22.19	25.27	26.73	27.89	26.59	26.98	21.02	6.8	29.5
TPES per capita (ktoe)	3.55	3.64	3.79	3.88	3.73	3.52	3.64	6.7	–4.1	2.3
GHG emissions without LULUCF (Tg CO_2 eq)	4249.34	4149.30	4139.24	4180.34	3999.05	3719.15	3797.61	–2.6	–8.3	–10.6
GHG emissions with LULUCF (Tg CO_2 eq)	4082.88	3963.89	3941.29	4007.91	3813.13	3521.12	3619.63	–3.5	–8.2	–11.3
CO_2 emissions per capita (Mg)	9.19	8.83	8.91	8.95	8.42	7.74	7.91	–3.0	–11.2	–13.9
CO_2 emissions per GDP unit (kg per 2000 USD using PPP)	0.44	0.40	0.35	0.34	0.30	0.29	0.30	–20.0	–14.7	–31.8
GHG emissions per capita (Mg CO_2 eq)	11.61	11.13	10.95	10.75	10.11	9.37	9.54	–5.7	–12.9	–17.9
GHG emissions per GDP unit (kg CO_2 eq per 2000 USD using PPP)	0.56	0.50	0.43	0.40	0.36	0.35	0.35	–22.2	–18.4	–36.5

Sources: (1) GHG emissions data: the European Union's 2012 greenhouse gas inventory submission, v. 1.2, of 25 May 2012; (2) Population, GDP and TPES data: International Energy Agency, 2010.

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.

Abbreviations: EU-15 = the 15 member States that formed the European Community at the time of ratification of the Kyoto Protocol, GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

[8] Decision 280/2004/EC concerning a mechanism for monitoring European Community greenhouse gas emissions and for implementing the Kyoto Protocol.

[9] The working groups (WGs) address the following areas: GHG inventories (WG1); implementation of the effort sharing decision, projections, and policies and measures (WG2); implementation of the EU emissions trading scheme (WG3); and carbon dioxide and cars (WG4).

15. The recent key institutional developments on climate change include the establishment in 2010 of a new DG Climate Action (DG CLIMA) within the EC. Previously the remit of the DG Environment, the DG CLIMA is responsible for the development and implementation of international and domestic climate action policies and strategies, leading on international climate negotiations, implementing the EU emissions trading scheme (EU ETS), monitoring the implementation of member States emission reduction targets in non EU ETS sectors, and the promotion of low-carbon and adaptation technologies. Other DGs support and complement these efforts, including the DG Energy, the DG Mobility and Transport, and the DG Agriculture and Rural Development. The NC5 has been prepared by the DG Environment (nowadays DG CLIMA) in consultation with the member States and adopted by the EC. Further legislative arrangements and administrative procedures, including those for the national system and the national registry, are presented in chapters II.A.2, II.A.3 and II.B.

16. The EU has provided a summary of information on GHG emission trends for the period 1990–2007. This information is broadly consistent with the 2009 GHG inventory submission. Summary tables, including trend tables for emissions in carbon dioxide equivalent (CO_2 eq) (given in the common reporting format), are also provided in an annex to the NC5. During the review, the ERT assessed the 2012 annual submission[10] and reflected the findings in this report.

17. The summary tables of the 2010, 2011 and 2012 annual submissions for the period 1990–2007 are not consistent with the data provided in the NC5, due to recalculations of the GHG inventory time series made in order to reflect, inter alia, changes in methodologies at the member State level. The EU explained that the impact of these recalculations for 1990 was small at the EU level as recalculations by the member States usually resulted in either increases or decreases in emissions for 1990 compared with the previous estimates, which partly offset each other when summarized at the EU level.

18. The total GHG emissions[11] in the EU-15 decreased by 10.6 per cent between 1990 and 2010, whereas total GHG emissions including net emissions or removals from land use, land-use change and forestry (LULUCF) decreased by 11.3 per cent. This decrease in total GHG emissions was mainly attributed to CO_2 emissions (constituting 82.9 per cent of total GHG emissions in 2010), which decreased by 6.4 per cent over this period. Over the same period, emissions of methane (CH_4) decreased by 30.6 per cent, while emissions of nitrous oxide (N_2O) decreased by 32.9 per cent.

19. The share of emissions of perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) (fluorinated gases (F-gases)) in total GHG emissions in the EU-15 increased from 1.3 per cent in 1990 to 2.2 per cent in 2010. It is noteworthy that HFCs were the only group of F-gases for which emissions increased between 1990 and 2010 (an increase of 162.3 per cent). This increase was driven by the phasing out of ozone-depleting substances such as chlorofluorocarbons and hydrochlorofluorocarbons under the Montreal Protocol and their replacement to a large extent with HFCs, mainly in refrigeration, air conditioning and foam production and as aerosol propellants. France, Italy, Germany and Spain reported the highest increases in absolute terms. Emissions of PFCs and SF_6 decreased by 81.4 per cent and 43.5 per cent, respectively, over 1990–2010. The other increasing trend is observed in GHG emissions from transport, which increased by 15.6 per cent during the same period mainly due to increased demand in road transportation.

[10] The EU-15 2012 greenhouse gas inventory submission, v. 1.2, of 25 May 2012.

[11] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding land use, land-use change and forestry, unless otherwise specified.

20. The ERT noted that the increase in GHG emissions due to growing population and transport was more than offset by the decrease in GHG emissions due to the decline in energy intensity, the restructuring of economic activity and related primary energy use, the change in trade patterns and the implementation of relevant PaMs.

21. Trends of total GHG emissions in the EU-15 were mostly underpinned by GHG emission trends in the energy sector, followed by the trends in the agriculture, industrial processes and waste sectors. In the energy sector, GHG emission trends were mainly driven by the dynamics of activities in road transportation, public electricity and heat production, manufacture of solid fuels, and households and services. In the agriculture sector, the GHG emission trends were mainly influenced by emissions from agricultural soils and enteric fermentation, driven mainly by a decline in the use of fertilizers and manure as well as in the number of livestock. In the industrial processes sector, GHG emission trends were driven by the production and consumption of halocarbons, production of nitric and adipic acids, and production of iron and steel. In the waste sector, GHG emission trends were driven by the quantities and management of solid waste disposal on land. An analysis of drivers for GHG emission trends in each sector is provided in chapter II.B.

22. Between 2009 and 2010, total GHG emissions in the EU-15 increased by 2.1 per cent, driven partially by (a) the recovery from the global economic recession in 2008–2009 in all member States; (b) a colder winter than in the previous year, in particular in Northern, Central and Eastern European countries, leading to an increased demand for heating and higher emissions from the residential and commercial sectors; and (c) a steep increase in emissions from iron and steel production and the manufacturing industry sector, driven by increased energy consumption. The GHG emissions from transport changed the increasing trend between 1990 and 2007 to a decreasing one, dropping by 6.0 per cent in 2007–2010 and by 0.7 per cent in 2009–2010, driven by a decrease in freight transport and an increase in fuel prices and the use of more efficient passenger cars. Table 2 provides an overview of GHG emissions by sector from the base year to 2010.

23. The ERT noted that GHG emissions from international bunkers increased by 58.8 per cent in the period 1990–2010. While GHG emissions in 2010 from international aviation (126,564 Gg CO_2 eq) were lower than those from international maritime transport (144,725 Gg CO_2 eq) in absolute terms, they are rising quite rapidly, by 95.4 per cent and 36.4 per cent, respectively. If added to the total GHG emissions in 2010, the share of GHG emissions from aviation bunkers was 3.2 per cent, whereas the share of GHG emissions from civil aviation was 0.4 per cent of the total GHG emissions.

24. The ERT encourages the EU, in its next national communication, to report in more detail on legislative arrangements and administrative procedures as well as the impact of the global economic downturn, and the impact of implemented PaMs on the GHG emission levels.

2. National system

25. In accordance with decision 15/CMP.1, the EU 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, as stated in decision 19/CMP.1. The Party also provided a reference to the 2009 annual submission, which contains a more detailed description of the national system. The description includes all the elements as required by decision 15/CMP.1.

26. The EU 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, also contribute to the conservation of biodiversity and sustainable use of natural resources. The mandatory

sustainability criteria for biofuels set under the renewable energy directive (see para. 63 below) [12] and requirements for impact assessments for all new legislation, programmes or projects (see para. 146 below) create a framework for the safeguarding of natural resources while undertaking activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

27. During the review, the EU provided additional information on the national system, elaborating on institutional and legislative arrangements and administrative procedures for GHG inventory planning, preparation, management and quality control/quality assurance systems. The ERT noted that the implementation of the MMD contributes to the improvement of consistency and accuracy of the GHG inventory, and that the forthcoming Monitoring Mechanism Regulation (MMR)[13] (see para. 43 below) will further enhance the quality of reporting.

Table 2
Greenhouse gas emissions by sector in the EU-15, 1990–2010

	GHG emissions (Tg CO_2 eq)							*Change (%)*		*Shares[a] by sector (%)*	
Sector	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*	*2010*	*1990–2010*	*2009–2010*	*1990*	*2010*
1. Energy	3278.15	3205.17	3257.58	3347.90	3198.36	2968.91	3041.58	–7.2	2.4	77.1	80.1
A1. Energy industries	1168.46	1107.46	1135.01	1218.29	1160.79	1062.54	1070.23	–8.4	0.7	27.5	28.2
A2. Manufacturing industries and construction	638.25	586.12	574.57	561.26	532.94	451.32	489.14	–29.3	8.4	15.0	12.9
A3. Transport	696.03	760.31	828.81	855.39	832.69	810.07	804.70	15.6	–0.7	16.4	21.2
A4.–A5. Other	678.40	664.82	649.45	658.69	623.71	598.51	631.43	–6.9	5.5	16.0	16.6
B. Fugitive emissions	97.00	86.46	69.74	54.26	48.23	46.47	46.09	–52.5	–0.8	2.3	1.2
2. Industrial processes	353.21	351.63	310.61	312.76	295.51	256.74	264.54	–25.1	3.0	8.3	7.0
3. Solvent and other product use	13.48	12.35	11.79	10.48	9.73	9.20	9.57	–29.0	4.1	0.3	0.3
4. Agriculture	433.70	414.06	414.38	389.03	383.25	374.67	373.81	–13.8	–0.2	10.2	9.8
5. LULUCF	–166.47	–185.41	–197.95	–172.42	–185.93	–198.03	–177.99	6.9	–10.1	–3.9	–4.7
6. Waste	170.81	166.10	144.88	120.18	112.22	109.65	108.11	–36.7	–1.4	4.0	2.8
7. Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA	NA	NA	NA
GHG total with LULUCF	**4082.88**	**3963.89**	**3941.29**	**4007.91**	**3813.13**	**3521.12**	**3619.63**	**–11.3**	**2.8**	**NA**	**NA**
GHG total without LULUCF	**4249.34**	**4149.30**	**4139.24**	**4180.34**	**3999.05**	**3719.15**	**3797.61**	**–10.6**	**2.1**	**100.0**	**100.0**

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.

Abbreviations: EU-15 = the 15 member States that formed the European Community at the time of ratification of the Kyoto Protocol, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] 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.

28. The ERT took note of the recommendations of the report of the individual review of the 2009 annual submission of the EU and noted that the recommendations of the ERT drive the continuous improvement of the GHG inventory reporting of the EU. The ERT

[12] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

[13] Regulation of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union levels relevant to climate change, 2011.

concluded that the national system continues to perform its required functions as set out in decision 19/CMP.1.

3. National registry

29. In its NC5, the EU 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 standard for data exchange between registry systems.

30. During the review, in response to questions raised by the ERT, the EU provided documents demonstrating how it records the changes related to the national registry and how it maintains these records. The ERT noted that updates of databases and applications, implemented security measures and changes to the national registry software are documented on a regular basis. The ERT also noted from the national inventory reports of the 2011 and 2012 annual submissions and the report of the individual review of the annual submission of the EU submitted in 2010 (ARR 2010)[14] that there have been minor changes to the national registry since the previous annual submission, such as the name of the registry administrator. The ARR 2010 also referred to the EU national registry being amended, but these amendments were limited to the EU ETS functions and did not affect international transactions undertaken under Articles 6, 12 and 17 of the Kyoto Protocol.

31. The ERT took note of the recommendations of the standard independent assessment report[15] that the EU should report if there was any change in the publicly available information about the national registry since its previous submission. During the review, in response to the ERT request, the EU informed the ERT that there were no such changes.

32. The ERT also took note of the conclusion of the ARR 2010 that the national registry continues to perform the functions as set out in decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

33. As required by the UNFCCC reporting guidelines, the EU 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. The EU 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 contains, with some exceptions, a similar set of PaMs to those in the NC4, though many have been revised or enhanced over this period and since the publication of the NC5.

34. Overall reporting on PaMs has improved over time. In the NC5, the EU provided extensive and comprehensive information on EU-level PaMs, which was helpfully framed by discussion of the overarching climate and energy policy and goals as well as the primary cross-cutting measures for achieving those goals. The ERT noted that future reporting could better explain the relationship and any interaction between the underlying PaMs in each sector with the overarching, cross-cutting policies, as well as assessment of how key

[14] FCCC/ARR/2010/EU.
[15] IAR/2010/EUC/1/1, IAR/2010/EUC/2/1.

individual PaMs may contribute towards the achievement of EU-wide goals. This encouragement was also provided in the in-depth review of the NC4.

35. A few of the recommendations from the IDR NC4 were taken into consideration in improving reporting in the NC5, including providing further reporting on the experience in phase II of the EU ETS. The ERT recommends that the EU in its next national communication include information on the total effect of PaMs by sector, and encourages the EU to report in more detail on the interaction of individual PaMs, in particular linkages of the cross-cutting measures like the EU ETS. The ERT considered that further enhancement of reporting on the methods for monitoring and evaluation of EU-level PaMs across member States would improve the transparency of the next national communication. The ERT noted that the forthcoming MMR will provide a solid basis for these further improvements in the transparency of reporting (see para. 43 below).

36. The EU provided comprehensive information on PaMs at the EU level, both those aimed at the implementation of the Kyoto Protocol target for its first commitment period and those aimed at the implementation of 2020 EU-wide targets. Whereas the EU-15 has a collective target for the reduction of GHG emissions by 8 per cent below base year levels for the first commitment period of the Kyoto Protocol, the EU-27 has a collective target for 2020, namely: a 20 per cent reduction in GHG emissions below 1990 levels; 20 per cent of final energy consumption to come from renewable resources; and a 20 per cent reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

37. The key framework policy reported in the NC5 is the EU Energy and Climate Package (2008). The package is framed by three targets for 2020: (a) a 20 per cent reduction in GHG emissions from 1990 levels; (b) a share of 20 per cent of energy from renewable sources in final energy consumption; and (c) a 20 per cent reduction in energy consumption below the 'business as usual' (BAU) scenario level. The package strengthens and enhances many PaMs already under implementation and includes new EU-level PaMs. Since the publication of the NC5, one of the proposals[16] contained in the package that addresses emissions from industrial processes has been finalized and adopted and several others have been further revised or proposed for revision.

38. A new development since publication of the NC5 is the adoption in 2011 of Roadmap 2050,[17] which provides a strategy for cost-effectively meeting the long-term EU objective of reducing GHG emissions by 80–95 per cent in 2050 compared with 1990 levels. Roadmap 2050 sets out an emissions pathway with intermediary milestones (–25 per cent in 2020, –40 per cent in 2030, and –60 per cent in 2040) that allow for a gradual decline in GHG emissions until 2020 (–1 per cent per year) with accelerated reductions between 2020 and 2030 (–1.5 per cent per year) and from 2030 to 2050 (–2 per cent per year). Projections indicate that PaMs currently in place would achieve a 60 per cent reduction by 2050 compared with the 1990 level. Roadmap 2050 highlights the focus areas before 2030 (e.g. shift in fuel used, efficiency in buildings, transport and agriculture) and after 2030 (e.g. shift to the use of electricity and renewables in transport and buildings, carbon storage and sequestration). Roadmap 2050 serves as a guide for the EU-wide, national and regional policies in the near and long term, providing certainty and predictability for the member States on necessary investment over a set time frame.

39. The cornerstone of the EU strategy to meet its Kyoto Protocol target is the EU ETS, which covers 40.7 per cent (in 2010) of the EU-27 total GHG emissions. The EU ETS is an innovative policy instrument that represents the first and the largest scheme to address

[16] The proposal for a directive on industrial emissions was adopted in 2010 as the industrial emissions directive 2010/75/EU.

[17] Roadmap for moving to a competitive low-carbon economy in 2050, 2011.

GHG emissions worldwide. Lessons from phase I (2005–2007) and phase II (2008–2012) have been taken into account in the 2009 revision of the EU ETS directive, which sets the framework for emission reductions in phase III (2013–2020) and strengthens the compliance mechanism under the scheme. As reported in the NC5, the most significant changes in phase III are: (a) the establishment of an EU-wide cap at 21 per cent below 2005 levels; (b) the expansion of the scope to include aviation and other industrial applications (for a total increase of 6–7 per cent of the EU ETS scope compared with phase II); and (c) the auctioning of 50 per cent of allowances for the EU ETS participants in most sectors. Since the NC5, additional decisions have been finalized on the EU ETS implementation, including new auctioning regulations, which require that half of the auctioning revenues be earmarked for further climate actions. The single EU cap contained in phase III of the EU ETS sets a linear annual GHG reduction factor of 1.74 per cent. This factor, applied beyond 2020, would lead to a 70 per cent GHG emission reduction by 2050 compared with 2005.

40. During the period of 2008–2012, there were limited cross-cutting PaMs to ensure the necessary emission reductions from the sectors not covered by the EU ETS in order to meet the Kyoto Protocol target for its first commitment period. However, the effort sharing decision (ESD),[18] adopted in 2009, sets the EU-wide target of a 10 per cent reduction from 2005 levels in 2020 and establishes a framework of binding annual targets for GHG emissions from non EU ETS sectors, covering 55 per cent of total EU-27 GHG emissions. Binding annual GHG reduction targets are set for individual member States based on their gross domestic product (GDP) per capita for 2013–2020. Flexibility is built into the target setting system through limited carry-over or carry-forward of the EU ETS allowances by each member State, transfers between member States, and by the limited use (up to 3 per cent) of each joint implementation (JI) or clean development mechanism (CDM) credit. Unlike the EU ETS, there is currently no provision for the ESD to continue beyond 2020, though a 2016 assessment of the ESD may propose continuation of its provisions.

41. The NC5 provides estimates of the effects of many of the PaMs in the 2010 or 2020 time frame reported by sector and by gas; however, information was not available in the NC5 on the effects of each individual reported PaM, nor was there information available on the impact in absolute terms of the various PaMs aggregated at the sectoral level. As was explained to the ERT during the review, there are significant synergies and overlap among the PaMs implemented at the EU level and those implemented at the individual member State level; in addition, there are difficulties in disentangling the effects of cross-cutting PaMs from those of PaMs in individual sectors, which complicates the estimation of the effects of individual PaMs. The ERT noted that information on the effects of individual PaMs reported by member States is publicly available on the European Environment Agency (EEA) website.[19] During the review, the Party provided the ERT with updated data on the aggregated effects of PaMs at the sectoral level (see table 5). In future communications, the ERT encourages the EU to report expected impacts for all PaMs, where possible, in order to provide further transparency, and to report aggregated impacts of PaMs by sector. The ERT noted that reporting on ex post evaluation of impacts would also be useful in comparing expected reductions with those actually achieved. The ERT also noted that the EC has commissioned several studies since 2008 to enhance the assessment and reporting of ex post impacts of PaMs by member States.

42. Given the inherent difficulty of ensuring that member States' implementation is sufficient to achieve EU-wide targets, the EU has focused significant efforts on monitoring and evaluation of the implementation of the EU-wide PaMs. The EU has in place an extensive system for monitoring and evaluation of GHG emissions and progress in

[18] Decision 406/2009/EC on the effort of member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

[19] <www.eea.europa.eu/themes/climate/pam/sector>.

achieving cross-cutting targets and goals, based on biennial reporting from the member States under the MMD, the primary vehicle for monitoring and evaluation of EU climate policy. The NC5 included limited information on the MMD and reported that no significant changes were made in monitoring the effectiveness of PaMs since the NC4. As a core element of the EU process of evaluation of the effectiveness of policies and compliance by member States, the MMD could be highlighted in more detail. A description of the importance of the MMD in informing evidence-based development of EU policies in the future could also provide helpful insight into the EU policymaking process.

43. During the review, the ERT was provided with additional information on the MMD and a proposal to strengthen the provisions of the MMD in a forthcoming MMR being currently considered by the Council and the European Parliament. The proposed MMR provides significant improvements to the MMD aimed at aligning it with the Climate and Energy Package, in particular by specifying reporting and monitoring provisions for GHG emissions from the non EU ETS sectors covered by the ESD. Also, the proposed MMR would increase reporting frequency (from biennial to annual), and include ex ante and ex post assessment of the effects of PaMs. The ERT encourages the EU to implement the proposed enhancements of the monitoring and evaluation, as they will facilitate more comprehensive and transparent reporting of the effects of PaMs in the next national communication.

44. To increase the transparency of the reported information on the impacts of individual PaMs, and to facilitate a better understanding of the importance of monitoring and evaluation within the EU system, the ERT encourages the EU to report in greater detail on its monitoring provisions in its next national communication. The ERT also encourages the EU to report on ex ante and, where available, ex post estimates of the impacts of individual PaMs, which will be facilitated through the proposed enhancements in monitoring and reporting.

45. The NC5 contains very limited information on the costs of implementation of the PaMs presented. During the review, the EU expanded on this information for some sectors. The EU may wish to address the implementation costs and fiscal effects of implemented PaMs in its next national communication.

46. The NC5 did not include information on policies and practices that could potentially increase anthropogenic GHG emissions beyond what would otherwise occur. Limited information was provided on one policy no longer in place since the NC4, namely, financial aid provided to farmers for energy crops as part of the 2003 Common Agricultural Policy (CAP) reform. No rationale for discontinuing this measure was provided. During the review, the EU substantiated the discontinuation of the policies no longer in place. The ERT encourages the EU to elaborate further on PaMs no longer in place and indicate the PaMs which could potentially increase emissions in the next national communication. Table 3 provides a summary of the reported information on the PaMs of the EU.

Table 3
Summary of information on policies and measures

Major policies and measures	*Examples/comments*
Policy framework and cross-sectoral measures	
20–20–20 Energy and Climate Package (2008)	The package of proposed new directives and decisions to achieve three key 2020 targets: 20 per cent reduction in GHG emissions below 1990 levels; 20 per cent of final energy consumption to come from renewable resources; and 20 per cent reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency
EU ETS, phase I (2005–2007),	The EU ETS for large-scale emitters (>20 MW), covering about 11,000

Major policies and measures	*Examples/comments*
phase II (2008–2012) and phase III (2013–2020)	installations that account for 45 per cent of EU emissions. In 2020, the EU ETS will reduce emissions of these installations by 21 per cent below 2005 levels
Effort sharing decision (2009)	The decision aims to reduce GHG emissions from non EU ETS sectors by 10 per cent by 2020 compared with 2005 and sets binding annual targets for 2012–2020 for these sectors, namely, for the transport, buildings, services, agriculture, industrial processes and waste sectors. The decision does not cover the LULUCF and international maritime sectors
Policies and measures by sector	
Energy supply and renewable energy sources	
Renewable energy directive (2009)	The directive sets a binding 20 per cent target for renewables in total EU gross final energy consumption in 2020 (production of electricity and heat and transport); it also sets targets for individual member States and requires preparation of national action plans to achieve these targets. (Expected GHG reduction potential is 600–900 Mt CO_2 eq. in 2020)
Biomass Action Plan (2005)	The plan aims at increasing the use of biomass for electricity and heat production and transport, improving biomass supply and expanding biomass research. (Expected GHG reduction potential is 36–58 Mt CO_2 eq. in 2010)
Carbon capture and storage directive (2009)	This directive aims to enable carbon dioxide capture and storage (CCS) by establishing a legal framework for the management of environmental risks related to CCS.
Energy efficiency	
Action Plan on Energy Efficiency (1998, 2000–2006, 2007–2012, replaced by Energy Efficiency Plan, 2011)	The plan aims at energy efficiency improvements in a variety of sectors to achieve a 20 per cent energy saving by 2020 compared with the ‘business as usual’ scenario
Directive on energy end-use efficiency and energy services (2006), a proposal for a new Energy efficiency directive (2011)	The directive aims to promote energy efficiency through member States’ indicative targets and action plans. (Expected GHG reduction potential is 92 Mt CO_2 eq in 2010)
Ecodesign directive (2005, recast in 2009)	The directive aims to reduce the environmental impact of the product life cycle through energy use labelling and energy efficiency requirements for products. Revision of this directive in 2009 provided for the extension of the scope of products. (Expected GHG reduction potential is 200 Mt CO_2 eq by 2020)
Energy labelling directive (1992, revised 2010)	The revised directive extends the scope to non-household products (e.g. motors) and energy-related products, introduction of A+++ label, mandatory demonstration of energy efficiency class in advertisement, and voluntary use in the technical specification of public procurement. (Expected GHG reduction potential is 26 Mt CO_2 eq by 2010)
Strategic Energy Technology Plan (2007)	The plan aims to accelerate the development and deployment of cost-effective low-carbon technologies, comprising measures relating to planning, implementation, resources and international cooperation in the field of energy technology
Residential and commercial	
Energy performance of buildings directive (2003), recast in 2010	The directive aims to improve the energy efficiency of buildings, and introduce energy performance certificates and minimum standards for energy performance of new buildings and any existing building subject to renovation. Recast includes provision for new and retrofitted nearly-zero energy buildings by 2020 (2018 for public buildings). (Expected GHG reduction potential of the directive

Major policies and measures	*Examples/comments*
	is 35–45 Mt CO_2 eq in 2010; of the recast, 160–210 Mt CO_2 eq)
Transport	
Renewable energy directive (2009)	The renewable energy directive set a binding minimum target of 10 per cent for renewable energy in transport in 2020, including sustainability criteria for biofuels
Strategy for an integrated approach to reduce CO_2 emissions from light-duty vehicles[a]	Regulation setting performance requirements for new light-duty passenger cars of 130 g CO_2/km in 2012–2015 and 95 g CO_2/km in 2020 encourages eco-innovation and introduces energy efficiency labelling
Revised EU ETS directive (2009)	The directive includes domestic and international aviation in the EU ETS starting in 2012. (Expected GHG reduction potential is 183 Mt CO_2 eq in 2020)
Industrial processes	
F-gases regulation (2006), mobile air conditioning directive (2006)	The regulation and the directive set requirements for, inter alia, containment, recovery, reporting, marketing and use restrictions of HFCs, PFCs and SF_6. (Expected GHG reduction potential is 23 Mt CO_2 eq. in 2010 (actually achieved 3 Mt CO_2 eq due to delays in implementation), 46 Mt CO_2 eq. in 2020 and 80 Mt CO_2 eq. in 2030)
Industrial emissions directive (2010)	Within this directive, the provisions of the integrated pollution prevention and control directive are elaborated, requiring installations to obtain permits based on the best available techniques
Sustainable Industry Low Carbon Scheme (since 2011)	This grant scheme is designed for energy-intensive manufacturing industries to assist in identifying, developing and deploying technological and non-technological innovations. The EU co-finances up to 75 per cent of the costs of the industry-led projects relevant to GHG emission abatement
Agriculture[b]	
CAP, Health Check of the CAP reform (2008)	The policy has no specific climate objectives but indirectly contributes to mitigation and adaptation. The policy includes agroenvironmental commitments and cross compliance, which provides for a set of mandatory management requirements for arable land, such as minimum soil cover, minimum land management and crop rotation. The Health Check of the CAP reform identified several crucial new challenges for European agriculture, including climate change and bioenergy. (Estimated GHG emission reduction potential for 2010 is 60–70 Mt CO_2 eq)
Nitrates directive (1991)	The directive seeks to reduce or prevent the pollution of water by nitrates from agricultural sources, such as the application of mineral fertilizer, and the application and storage of manure on farms. (Estimated GHG emission reduction potential for 2010 is 10 Mt CO_2 eq)
Soil Thematic Strategy (2006)	The strategy seeks to protect soils across the EU. In 2012, the European Commission published a policy report on the implementation of the strategy and ongoing activities (COM (2012) 46)
Forestry	
The EU Forest Strategy (1998)	The strategy seeks coherence between the various sectoral PaMs
The EU Forest Action Plan for 2007–2011 (2006)	The plan defines a framework of 18 key actions to protect forest land across the EU, including actions such as adaptation to the effects of climate change, the European forest monitoring system and protection of the EU forests
Green paper on forest protection (2010)	The green paper calls for the establishment of an EU framework for action, the launch of a debate on forest protection and information, and the updating of the EU Forestry Strategy
The EC Rural Development	The policy includes targeted support for climate change adaptation and mitigation; forest management, afforestation and reforestation measures, forest

Major policies and measures	*Examples/comments*
Policy (2007–2013)	fire protection measures and preventive measures to maintain the environmental and economic services of forests [left align]
Waste	
Waste framework directive (2008)	The directive aims at waste prevention, reuse, recycling, recovery and disposal and introduces relevant targets, the 'polluter pays principle' and the 'extended producer responsibility'; and includes two new targets for 2020: 50 per cent reuse and recycling of household waste, and 70 per cent for construction and demolition waste. Requires that each member State adopts waste management plans and waste prevention programmes
Landfill directive (1999)	The landfill directive seeks to prevent or reduce the negative effects of waste disposal on land, by introducing stringent technical requirements for waste and landfills, and includes measures to control emissions of CH_4 in the form of energy production or flaring

Abbreviations: CAP = Common Agricultural Policy, EU = European Union, EU ETS = EU emissions trading scheme, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PaMs = policies and measures.

[a] Regulation (EC) No. 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles.

[b] The agriculture sector is covered by the effort sharing decision and the renewable energy directive, which are described in the table.

1. Policy framework and cross-sectoral measures

47. The European Climate Change Programme (ECCP), established by the EC in 2000, provides the main framework for policy development to implement the Kyoto Protocol in 2000–2004. The NC5 describes the second ECCP (2005), which expanded the first ECCP to include new policy areas such as adaptation, aviation and carbon dioxide capture and storage (CCS). Since 2009, new policy actions have been proposed and adopted for implementation in line with the further development of the EU climate change strategy for 2020 and Roadmap 2050. This strategy development has also resulted in the strengthening of existing PaMs and the introduction of new policies compared with what is presented in the NC5. During the review, the EU provided the ERT with updates on the most important policy actions taken since the NC5 and the information has been incorporated in this report.

2. Policies and measures in the energy sector

48. Between 1990 and 2010, GHG emissions from the energy sector decreased by 12.6 per cent in the EU-27 and by 7.2 per cent in the EU-15. The main drivers of emission reductions were the decline in emissions from manufacturing industries and construction (which declined by 29.3 per cent in the EU-15 and by 36.9 per cent in the EU-27) and more recently the decline in emissions from electricity generation. These reductions were somewhat offset by notable increases (see para. 60 below) in emissions from transport. The framework for addressing emissions from the energy sector is the EU Energy and Climate Package with its targets for energy production and consumption, which is implemented through a mix of PaMs at the EU and member State levels.

49. ***Energy supply***. The GHG emissions from energy have decreased despite growing demand for electricity in the EU, driven in the early 1990s by the closure of inefficient coal-fired power plants and more recently by a fuel shift from coal and oil to natural gas and biomass. CO_2 emissions from manufacturing industries and construction also declined since 1990, driven primarily by a decline in activity and by energy efficiency improvements.

50. The pivotal instrument for addressing GHG emissions from energy production is the EU ETS, which covers all combustion installations with capacity greater than 20 MW (over 11,500 facilities in total, including power plants, oil refineries and installations in the metal, mineral, and pulp and paper industries). The EU ETS planned to achieve a 21 per cent reduction of GHG emissions from the covered sectors compared with 2005 levels. Robust monitoring and verification, and the compliance system in place ensures the implementation of this instrument.

51. In addition, the energy taxation directive (2003) provides EU-wide rules for taxation of energy products (including those used as motor or heating fuel and electricity), providing common taxation rules and minimum tax levels for the member States. Proposed revisions to this directive by the EC in 2011 would bring the rules and rates in line with the energy and climate change objectives of the EU for 2020.

52. ***Renewable energy sources***. A key pillar of the EU Energy and Climate Package is the promotion of renewable energy, based on the related target of a 20 per cent share of energy from renewable energy sources in final energy consumption in 2020. The share of energy from renewable energy sources in final energy consumption has been rising steadily since 1990: from 4 per cent in 1990 to 9 per cent in 2000, and 12.4 per cent in 2010. This share varies significantly among the member States, mainly due to differences in renewable energy potential and early exploitation of available fossil fuel resources.

53. The renewable energy directive[20] (2009) is the primary instrument for achieving the 20 per cent renewable target by 2020. The implementation of the provisions of this directive is a responsibility of individual member States, which have developed and submitted their national renewable energy action plans (NREAPs) in accordance with the binding national targets set by the directive. The plans set out 10-year road maps including indicative annual and interim targets, as well as a suite of measures and support schemes for renewables across sectors. According to data of the statistical office of the EU (Eurostat), 18 member States had already reached their first interim target under the directive in 2009, while the remaining member States are on track to meet their 2020 target. An assessment of member States' NREAPs indicate that 20.6 per cent of energy production could come from renewable sources in 2020, which slightly exceeds the EU target. The electricity sector is expected to account for 45 per cent of this growth (with wind power production making the largest contribution, followed by hydropower, biomass and solar power), heating is expected to account for 37 per cent (with biomass remaining the dominant source) and transport is expected to account for 18 per cent (with the largest share contributed by the use of biodiesel, followed by bioethanol and other renewable energy sources).

54. The ERT noted the diverse range of renewable energy potentials and capacity and energy generation costs as well as the range of support schemes in place to address specific barriers among individual member States. The ERT also noted the importance of assessment at the EU level of the effectiveness of various approaches used by the member States and further efforts to remove administrative and infrastructure barriers at the EU level.

55. The CCS directive (2009) establishes a solid legal framework for the management of environmental risks related to CCS, including requirements on permitting, site selection, monitoring, reporting, corrective measures, closure, transfer of responsibility and financial security. Member States are free to determine that CCS should not happen in parts or all of their territory. Transposition and implementation of the directive are on-going.

[20] Directive 2009/28/EC.

56. The NER300 programme was established under Article 10a(8) of the EU emissions trading directive. 300 million allowances have been made available in the new entrants reserve of the EU ETS to co-finance large-scale demonstration projects for CCS and for innovative renewables technologies. The 300 million allowances are distributed through two rounds of calls for proposals, covering 200 million allowances and 100 million allowances, respectively. The European Investment Bank is monetizing the allowances and also supporting the EC in the project evaluation. The first call for proposals was launched in November 2010. Award decisions are envisaged for the end of 2012.

57. ***Energy efficiency***. Efforts to improve energy efficiency are another important pillar of the Energy and Climate Package, which includes a target of a 20 per cent reduction in energy consumption below BAU by 2020. The Action Plan on Energy Efficiency addresses both the supply and the demand side, aimed at ensuring a dynamic improvement of the market for a range of household and industrial products and appliances. The ecodesign directive (recast in 2009), aimed at improving the environmental performance of products throughout their life cycle, through application of product design standards, was revised in 2009 to extend its scope to energy-related products from all sectors (except transport). On the demand side, the energy labelling directive[21] (revised in 2010) harmonizes national measures for the publication of information on energy consumption by household appliances and imposes compulsory minimum energy efficiency requirements. The 2010 revision broadened the scope to include non-household products and energy-related products, as well as enhanced labelling and incentive programmes. An assessment of progress in 2008 indicated that the current legislation will achieve only half of the required reductions (around 9 per cent), primarily due to slow building turnover and insufficient economic incentives to households to undertake energy efficiency improvement measures.

58. To address the remaining gap of an 11 per cent reduction or 204 Mt CO_2 eq, in 2011 the EC adopted a new energy efficiency plan and proposed a new Energy efficiency directive which will (in 2014) repeal the Energy services directive and the Cogeneration directive. The Energy efficiency directive would strengthen current EU measures and introduce new requirements for the member States to adopt indicative national targets for energy consumption. It is expected that, further to political agreement in, which occurred in June 2012, the directive could be formally adopted in October 2012. An impact assessment of the proposed requirements suggests that achievement of the full potential of energy efficiency will lead the EU to exceed the 20 per cent energy consumption reduction target in 2020, reaching as high as 25 per cent. Greater potential for reductions of energy consumption has been identified in all relevant sectors, with particular focus on buildings (both commercial and residential).

59. Buildings are currently responsible for 40 per cent of energy consumption and 36 per cent of CO_2 emissions in the EU. Improving the energy performance of buildings is a key focus of further improvements to the Action Plan on Energy Efficiency. In 2010, the energy performance of buildings directive (EPBD) was revised (now the recast EPBD) to include minimum energy performance requirements set by the member States for all new buildings and existing buildings undergoing major renovation. It also requires all new buildings to be "nearly zero energy" as of the end of 2020, with an earlier date of 2018 for the public sector.

60. ***Transport sector***. Emissions from transport represent a growing share of total EU emissions (reaching 21.2 per cent in 2010) and addressing these emissions will be an important focus of future efforts. Between 1990 and 2010, transport emissions, excluding

[21] Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (recast).

international bunkers, increased by 19.9 per cent (15.6 per cent for the EU-15) demonstrating a somewhat lower growth rate since 2000 compared with the previous decade. The increase in emissions from transport was driven primarily by increased economic growth and corresponding transport demand. The share of road transport grew over other modes, despite improvements in fuel efficiency of passenger and freight vehicles. Policies in place to reverse these trends include the introduction of requirements for light-duty vehicle CO_2 reductions and complementary measures, as well as the EURO V and EURO VI standards.

61. The most notable reductions are expected from the 2007 strategy for an integrated approach to reduce CO_2 emissions from light-duty vehicles which set a target of 120 g CO_2/km to be achieved in 2012 by a range of measures. This includes emission performance standards for cars, which set a target of 130g CO_2/km to be phased in from 2012 to 2015 and 95 g CO_2/km in 2020. A number of complementary measures (e.g. gear shift monitoring, tyre pressure monitoring, tyre labelling) are expected to deliver an additional 10 g CO_2/km. Strict non-compliance penalties (95 Euro/g) apply, starting in the beginning of 2012. The 2007 strategy also includes a target of 95 g CO_2/km to ensure long-term progress in emission reductions.

62. As the EU explained to the ERT during the review, a delay in the implementation of some of the complementary measures has meant that it is not likely that the 120 g CO_2/km target will be met in 2012. This is, however, in part compensated by the reductions achieved since 2007 by car manufacturers in average emissions from new car fleets, which on average have decreased over the past decade (by 21 per cent) based on the collection of registration data from member States. Early compliance with the 130g CO_2/km target is expected by a number of large manufacturers, and progress in the implementation of complementary measures is expected to ensure that the 2015 target is achieved.

63. Transport fuels are another area where EU PaMs seek to reduce emissions. The renewable energy directive includes a target of 10 per cent of transport fuels from renewable sources in the transport sector in 2020, which is to be met by all member States. It is expected that first generation biofuels will be the predominant source of biofuels by 2020; the directive includes sustainability criteria for biofuels used in the EU, whether locally produced or imported. These criteria aim, inter alia, to prevent the conversion of areas of high biodiversity and high carbon stock for the production of raw materials for biofuels and they set a minimum rate of GHG savings compared with fossil fuels, which increases over time by 2020. The directive also includes an enhanced monitoring system to assess the impacts of EU biofuels policy in the EU and in third countries.

64. Emissions from aviation bunker fuels in the EU have increased by 95.4 per cent from 1990 to 2010. The revised EU ETS directive covers international aviation starting in 2012, with application to flights landing at or departing from European airports. Starting in 2013, airlines will be required to hand in allowances for CO_2 emissions on an annual basis. Eighty-five per cent of allowances are subject to free allocation, whereas the remaining 15 per cent will be auctioned. The 2012 cap is set at 3 per cent below the baseline (the average annual emissions of 2004–2006), which is increased to 5 per cent in 2013–2020. Cumulative emission reductions are expected to reach 400 Mt CO_2 eq by 2020. All revenue from auctions of aviation allowances should be channelled to climate change activities, including research and development for aviation technology.

65. Though not as steep as aviation, emissions from maritime bunker fuels have also increased from 1990 to 2010 (36.4 per cent). International maritime transport is the only transport mode not yet covered under an EU-level emission reduction target, as all other transport modes, including domestic shipping, are covered by targets pursuant to the EU ETS or the ESD. While the EU has only observer status in the International Maritime Organization (IMO), it works closely with member States to ensure that EU law takes into

account the rules agreed under IMO, including the most recent adopted energy efficiency measures.

66. Looking forward, in 2011, the EU adopted the White Paper on Transport, which provides a non-binding road map of 40 initiatives for the next decade that aim to create a single, fully integrated transport network, which links the different modes and allows for a shift in transport patterns for passengers and freight. By 2050, key goals include: no conventionally fuelled cars in cities; 40 per cent use of sustainable low-carbon fuels in aviation; at least 40 per cent cut in shipping emissions; a 50 per cent shift of intercity passenger and freight journeys from road to rail and water; and a 60 per cent cut in GHG emissions.

3. Policies and measures in other sectors

67. Between 1990 and 2010, GHG emissions from non-energy sectors decreased by 22.2 per cent, nearly double the rate of reduction from the energy sector. Emission reductions over this period ranged from 13.8 per cent from agriculture to 36.7 per cent reductions from waste.

68. ***Industrial processes***. Between 1990 and 2010, GHG emissions from the industrial processes sector decreased in the EU-27 by 26.3 per cent and in the EU-15 by 25.1 per cent. In the 1990s, reductions were mainly driven by low economic activity and cement production in the member States, as well as GHG abatement measures in adipic acid production. In 2000–2010, emission reductions were driven by reduced production as well as PaMs implemented in cement, and iron and steel plants. However, these reductions have been somewhat offset by the 47.3 per cent increase in F-gases in the EU-15, driven by a tripling in HFC emissions, which reached a historical high in 2010 due to the rapid implementation in the EU of the phase out of ozone-depleting substances ahead of the schedule under the Montreal Protocol and increased use of appliances such as air-conditioning equipment.

69. In 2010, the EU adopted the industrial emissions directive,[22] which combines and streamlines the existing relevant directives into a single legal framework for addressing emissions from fuel use and industrial processes in industry.

70. Success in emission reductions for F-gases, in particular HFC emissions from consumption of halocarbons, primarily in refrigeration and air-conditioning end uses, has so far been limited. The F-gases Regulation[23] and the mobile air conditioning (MAC) directive,[24] both from 2006, are the primary legislative vehicles for addressing F-gas emissions. The NC5 reports expected emission reductions of 23 Mt CO_2 eq in 2010 (based on estimations made in 2002–2003). Ex post analysis indicates that reductions of only 3 Mt CO_2 eq have been verifiably achieved to date, resulting mainly from placing on the market bans and controls of use of refrigeration and air-conditioning, while containment measures have not been found to be very effective to date, owing to the lack of a long-time data series and because many member States were late in adopting and applying legislation. If fully implemented, the potential for reductions from the F-gases Regulation above and MAC (33 Mt and 13 Mt, respectively, in 2020) is only expected to stabilize emissions, but will not be sufficient to meet the EU climate goals. The EU is considering additional

[22] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

[23] Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases.

[24] Directive 2006/40/EC of the European Parliament and of the Council of 17 May 2006 relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC.

measures in an on-going review of the F-gases Regulation, in particular stronger measures to reduce the use of HFCs in new equipment. The ERT noted that improvements in member State reporting requirements could facilitate and inform future efforts at the EU level.

71. ***Agriculture***. In 2010, agriculture accounted for 9.8 per cent of total GHG emissions in both the EU-27 and the EU-15. GHG emissions from agriculture decreased by 13.8 per cent in the EU-15 and by 22.3 per cent in the EU-27 during 1990–2010. These decreasing trends are driven mainly by the decline in the use of fertilizers and manure, and in numbers of livestock. In 2010, in the EU-15, CH_4 accounted for 44.3 per cent of agricultural emissions while N_2O accounted for 55.7 per cent. The ERT noted that the land area under agricultural use across the EU-27 States has decreased by approximately 10 per cent from 1990 to 2005; however, it increased after 2007 due to the return into production of the land set aside under the CAP.

72. Since the NC4, the EU has put in place a few new requirements seeking to reduce GHG emissions from agriculture. Next to the key PaMs in this sector, which have the biggest GHG reduction potential (see table 3), the CAP, the nitrates directive,[25] the ESD (see para. 40 above) and the renewable energy directive (see para. 53 above) were added. The NC5, together with information provided during the review, presented a clear description of how different PaMs in the agriculture sector interact with, and complement, each other.

73. ***LULUCF.*** The LULUCF sector was a net sink of 312 Tg CO_2 eq in the EU-27 and of 178 Tg CO_2 eq in the EU-15 in 2010. In 1990–2010, the net GHG removals increased by 8.9 per cent and 6.9 per cent for the EU-27 and the EU-15, respectively. The increasing trend was mainly driven by the member States' forest policies and the EU agricultural and environmental policies, which have resulted in less intensive agricultural practices and in an increase in forest and woodland conservation areas.

74. Since forest policy is within the remit of the member States, so far there has been no common EU forest legislation. The NC5 further elaborates on the same measures that were described in the NC4. The EC is currently updating the EU Forest Strategy (1998), which primarily seeks to provide coherence between the various relevant sectoral PaMs. With the main principles of sustainable forest management and multi-functionality, the strategy forms the basis for forestry measures under rural development in the CAP. The Green Paper on Forest Protection and Information (which was intended to start a discussion on the possible need for additional EU-level action related to the protection of forests in the light of climate change) as well as the EC Rural Development Policy play a role in forest management in the EU (see table 3). During the review, the EU informed the ERT that determining how the existing plans and strategies in this sector would modify longer-term trends of GHG emissions and removals would be a challenging exercise for the EU, owing to various PaMs implemented by the different member States.

75. Seeking to address emissions and removals from LULUCF, the EC, based on the outcomes of the consultations and assessment, has prepared a legislative LULUCF proposal.[26] The proposal aims to set robust rules for forest management, cropland, grazing land, re-wetting and drainage, and revegetation, in line with the rules under the Convention process. It is expected that the proposal will be adopted in the beginning of 2013.

76. Similarly to forest policy, afforestation, reforestation and deforestation are primarily overseen by the member States; therefore, in general, the EU-wide instruments are not

[25] Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC).

[26] Commission proposal for a decision of the European Parliament and the Council on accounting rules and action plans on greenhouse gas emissions and removals resulting from activities related to LULUCF COM(2012)93 final 2012/0042 (COD).

applicable to these activities. However, the EU instruments most relevant to addressing these activities include the birds[27] and habitats[28] directives, the mandatory sustainability criteria set for biofuels under the renewable energy directive (see para. 63 above) and the environmental impact assessments carried out for projects and PaMs. For the first commitment period of the Kyoto Protocol, each member State decided whether or not to elect Article 3, paragraph 4, activities and when to account for GHG emissions and removals from these activities. Reporting on the safeguards associated with the chosen activities is also the responsibility of the individual member States.

77. ***Waste management***. Between 1990 and 2010, GHG emissions from the waste sector decreased by 30.4 per cent in the EU-27 and by 36.7 per cent in the EU-15, mainly driven by the reduction in solid waste disposal and of biodegradable waste going to landfills, and the increase in landfill gas recovery due to the implementation of the EU landfill directive. While landfill waste management was the main driver of reductions, emissions from landfills continue to represent a large share of overall emissions from the sector (76.3 per cent in 2010) and will be a priority for future reductions. Recent assessments indicate that while municipal waste volumes have remained relatively stable over the past decade, despite population and economic growth, there has been more success in waste prevention and shifts away from landfilling of waste. The 2020 Roadmap on Resource Efficiency includes an aspirational objective of the virtual elimination of landfilling across member States by 2050.

78. The primary measures for addressing emissions from waste are the waste framework directive[29] and the landfill directive.[30] The framework directive, revised in 2009, addresses waste management, recovery and disposal, and requires member States to promote waste prevention, recycling and reuse. The landfill directive includes measures to control emissions of CH_4 in the form of energy production or flaring. Slow adoption of full measures by member States, however, has meant benefits to date that are more modest than planned. An assessment of estimates from a 2007 assessment finds that full implementation of the landfill directive measures would achieve significant additional reductions of 110 Mt CO_2 eq from 1995 levels by 2020, 42 per cent more than a BAU scenario.

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

79. In its NC5 the EU 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, under Article 4, paragraphs 8 and 9, of the Convention. Further information on how the EU strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on the developing country Parties, as reported in the 2012 annual submission, is presented in chapter II.I of this report.

80. The NC5 provided some information on the promotion of biofuels following the provisions of the renewable energy directive. Certain sustainability criteria have been established to ensure that there are no negative impacts on developing country Parties

[27] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (amended Directive 79/409/EEC).

[28] Directive 92/43/EEC of the European Council of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

[29] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives.

[30] Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

exporting biofuels or raw materials for biofuels to the EU. The NC5 indicates that the EC has to report biennially, starting in 2012, with respect to both developing countries and member States on sources of biofuels or of raw materials for biofuels consumed within the EU, on national measures taken to respect the sustainability criteria for soil, water and air protection. The EU also has initiatives such as the EU Timber Regulation aimed at preventing the putting on the EU market of illegally produced timber. The EC also published a communication on deforestation, which addresses global deforestation and loss of forest cover.

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

81. The NC5 contains GHG projections and an estimate of the total effect of PaMs based on data presented in the EEA report published in 2009.[31] During the review, the EU provided updated projections, based on the EEA report published in 2011,[32] which are considered in this review report along with projections reported in the NC5.

1. Projections overview, methodology and key assumptions

82. The GHG emission projections provided by the EU in the NC5 include 'with measures', 'with additional measures' and 'without measures' scenarios until 2020, presented relative to actual inventory data for 2007. Projections are presented on a sectoral basis, using the same sectoral categories as in the PaMs section and on a gas-by-gas basis for the following GHGs: CO_2, CH_4, N_2O and F-gases. Projections are also provided in an aggregated format for each sector as well as for a national total, using global warming potential values. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and were not included in the totals.

83. The 'with measures' scenario includes PaMs that were implemented or adopted at the time of the preparation of the NC5. The 'with additional measures' scenario includes the effect of planned PaMs assumed to be fully implemented. The 'without measures' scenario excludes the effects of PaMs from the year 2000. The ERT noted that only seven member States provided a 'without measures' scenario for the NC5 and that, as a result, the EEA had to derive the 'without measures' scenario by adding the total effect of implemented PaMs (GHG emissions avoided) to the 'with measures' scenario GHG emission levels for the years 2010, 2015 and 2020. There are, however, some limitations with this method. On the one hand, estimates of the total impact of PaMs are likely to be underestimated because not all member States estimated the effect of all their PaMs. As a result, the GHG emissions level of the 'without measures' scenario is also likely to be underestimated. On the other hand, the fact that individual member States' total effect of PaMs did not account for policy interactions might have resulted in double counting of GHG emission reductions, in which case the 'without measures' scenario's GHG emissions level would be overestimated. Overall, the EU estimated in its NC5 that the 'without measures' scenario's GHG emissions level is likely to be underestimated. The ERT noted that the provision of a 'without measures' scenario will become mandatory should the revised MMR come into force.

[31] European Environment Agency. 2009. *Greenhouse Gas Emission Trends and Projections in Europe 2009. Tracking progress towards Kyoto targets.* Luxembourg: Publications Office of the European Union.

[32] European Environment Agency. 2011. *Greenhouse Gas Emission Trends and Projections in Europe,* Luxembourg: Publications Office of the European Union.

84. The GHG emission projections presented in the NC5 were prepared by the EEA. The MMD requires member States to report 'with measures' and 'with additional measures' scenarios to the EC every two years. The EEA then undertakes consistency, accuracy and completeness checks and aggregates the member States' projections into an EU-wide projection (bottom-up approach). The EEA develops the projections with several partners including the European Topic Centre on Air Pollution and Climate Change Mitigation, the DG CLIMA and relevant ministries and agencies in member States.

85. The NC5 provides limited information on the methodology used to derive the EU-wide GHG emission projections. During the review, the EU provided a detailed overview of the aggregation methods, including the adjustment to ensure the completeness of the member States' projections by gap-filling missing projections with alternative data sets, an adjustment to align the starting year of member States' projections of the latest GHG inventory data and an adjustment to ensure consistency between sectoral and total projections. The ERT noted that additional information on the gap-filling method used was available in the updated projections report and the accompanying technical paper,[33] which describe in detail the aggregation methodology. The ERT noted this additional information and encourages the EU to improve the transparency of the next national communication by including in it these elements.

86. The ERT noted that the EC also derives an additional, EU-wide set of projections using a top-down approach. This top-down modelling approach, generally used for EU-wide policy development and assessment, is also used to provide the basis for consistent input assumptions for member States, in particular the EU ETS carbon price and international energy prices. In addition, the top-down modelling serves as an alternative projection for member States where parts of their projections are missing. The EU-wide top-down approach consists of two economic partial equilibrium models (PRIMES, covering the whole energy system and CO_2 emissions; CAPRI, covering agricultural trends) and an integrated assessment model (GAINS, which covers non-CO_2 (and other) emissions). The ERT noted that the EU does not intend to use this EU-wide modelling approach for preparing the EU-wide projections in the future for reporting under the Convention because it is currently a priority to build the capacity of member States to undertake their own projections, to enable them to assess progress towards their targets, in particular under the ESD.

87. The NC5 presented limited information on assumptions used in the projections and did not include a discussion on how the key assumptions have changed since the NC4. The ERT encourages the EU to provide this information in the next national communication. It was noted that due to the different modelling approaches used by member States, assumptions are not always readily comparable. The NC5 reported on the assumptions made by member States on GDP growth, international oil price, heating degree days and change in energy demand per capita (2010–2020). This comparison showed that there can be significant differences in some key assumptions. For example, the international oil price for 2010 varied from USD 56/boe to about USD 400/boe. Yet, the extent to which the aggregation of member States' projections is sensitive to such variations was not presented in the NC5.

88. Overall, the process in place to aggregate member States' projections into an EU-wide projection allowed only for a superficial analysis of the EU projections since the methods, parameters and assumptions used in each member State were not considered. Yet, the ERT noted that there was additional analysis of GDP and population as key

[33] Okamura S, Watterson J, Misra A, Stewart R, Griffin A, Mellios G, Mandl N and Rigler E. 2012. *Assessment of the Member States' Projections Submitted under the EU Monitoring Mechanism in 2011*. Bilthoven: European Topic Center on Air Pollution and Climate Change Mitigation.

assumptions included in the technical paper mentioned in paragraph 85 above, which outlines the consistency and accuracy checks made on these parameters. The ERT noted the improvement in the analysis of key assumptions compared with the NC4 and encourages the EU to continue to improve the consistency and accuracy of assumptions in member States' projections and include a summary of this analysis in its next national communication.

89. The NC5 did not provide a sensitivity analysis of the EU projections, but referred to the sensitivity analyses conducted by member States in their own national communications. While 21 out of 27 member States provided this information to the EC, the EU explained that resource constraints, low methodological feasibility of aggregating the results of sensitivity analyses of different projections of data sets of the member States as well as the limited availability of sensitivity analyses for all member States were hampering its efforts to improve this aspect of the analysis. The ERT considers that a sensitivity analysis of key assumptions is an important aspect of transparency of the projection and encourages the EU to include this analysis in its next national communication.

2. Results of projections

90. Under the Kyoto Protocol, the EU-15 has a GHG emissions reduction target of 8 per cent from the base year level to the period 2008–2012. In the NC5 projections, the 'with measures' scenario shows that GHG emissions from the EU-15 were expected to decrease to about 3,946 Mt CO_2 eq in 2010 (7.5 per cent below the base year level of 4265 Mt CO_2 eq). For the 'with additional measures' scenario, without taking into account the use of Kyoto mechanisms, GHG emissions from the EU-15 were expected to decrease to about 3,873 Mt CO_2 eq in 2010 (9.2 per cent reduction below the base year level).

91. During the review, the EU provided information on projections updated in 2011, according to which GHG emissions in the EU-15 for the 'with measures' and 'with additional measures' scenarios are slightly lower than in the NC5, at, respectively, 3,773.0 Mt CO_2 eq in 2012 (11.5 per cent below the base year level) and 3,681.3 Mt CO_2 eq in 2012 (13.7 per cent below the base year level) (see figure below). Based on the updated projections that reflect the impact on emissions from the economic crisis after 2008, the EU-15 as a whole expects to meet its Kyoto Protocol target by domestic efforts alone; however, some member States will require the use of the Kyoto mechanisms to reach their individual targets. More specifically, six member States are on track to achieve their individual GHG reduction targets through domestic action only. Of the remaining nine member States that plan to use the Kyoto mechanisms in addition to the domestic effort, only three member States might face difficulties in achieving their targets.

92. The NC5 and the updated projections present the breakdown of the Kyoto Protocol target into domestic achievements, the use of the Kyoto mechanisms and the use of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. As a share of the target of the EU-15 of an 8 per cent reduction from base year level of emissions, the planned use of the Kyoto mechanisms accounts for approximately 2.5 per cent of the EU-15 reduction commitment. On the same basis, activities under Article 3, paragraphs 3 and 4, are expected to contribute 0.9 per cent to the EU-15 reduction commitment. In this domestic context, the EU ETS is expected to contribute the largest portion of the total GHG emission reductions during the 2008–2012 period.

93. For the EU-27, the NC5 projected a decrease in GHG emissions to a level of 6.4 per cent below the 1990 level by 2020 under the 'with measures' scenario and 14.3 per cent below the 1990 level under the 'with additional measures' scenario. However, at the time of the NC5, not all member States had incorporated the effects of the economic downturn in their projections and 16 member States had not yet accounted for the EU 2020 Climate and Energy Package in their projections estimates.

94. The updated projections show that the EU-27 is making good progress towards its target of a 20 per cent reduction in GHG emissions below the 1990 level. The projections show that with current domestic PaMs ('with measures' scenario), emissions are expected to reach 19.2 per cent below the 1990 level, just short of the 20 per cent target. With the use of international credits, depending on the rules set for their use, the EU could reach its 20 per cent GHG reduction target. If all additional measures were fully implemented, the 'with additional measures' scenario projection suggests that the EU-27 could overachieve this target and reduce emissions by 25.2 per cent below the 1990 level. The results from the alternative method applied by the EEA using the top-down approach accordingly show that GHG emissions could to reach 22 per cent below the 1990 level in 2020.

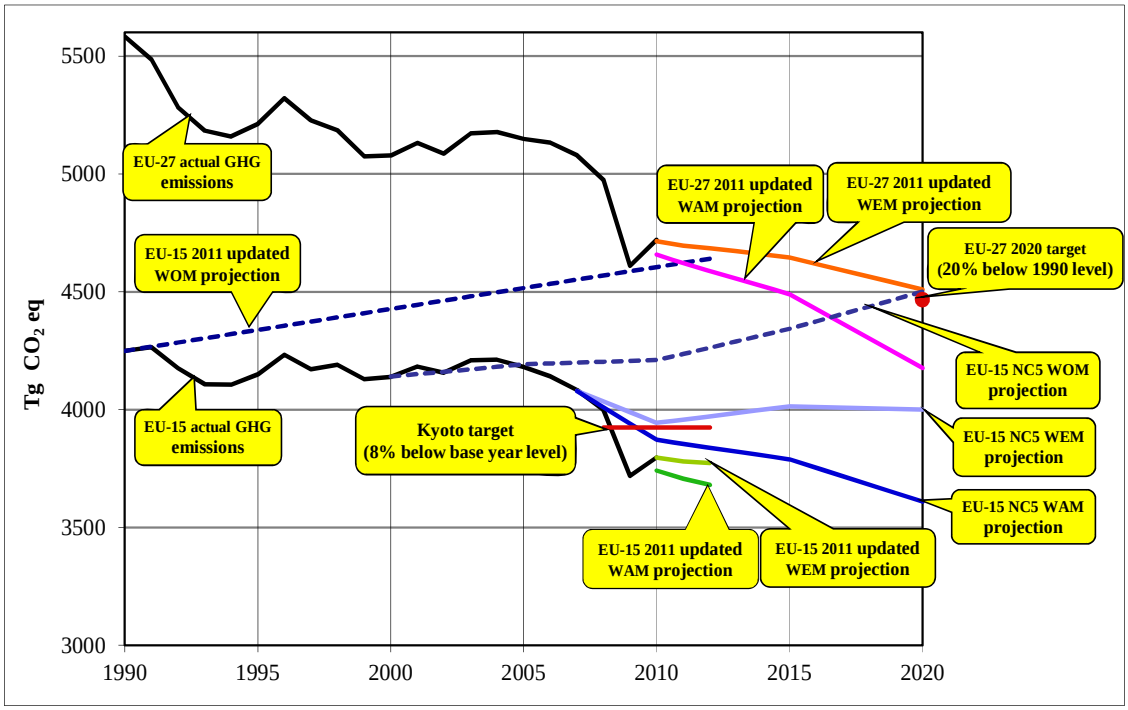
95. The EU ETS makes the largest contribution to these reductions, with the cap set to reach a 21 per cent reduction compared with the 2005 level. The ESD also makes an important contribution to achieving the 2020 target, by reducing emissions in the non EU ETS sectors by 10 per cent compared with the 2005 level. A key challenge for the EU will be to ensure that member States implement sufficient PaMs to achieve the reductions needed in the non EU ETS sectors, where emission reductions are less certain compared with those from the EU ETS sectors.

96. The ERT noted that, in addition to the 20 per cent reduction target for 2020 from the 1990 level, the EU-27 has set a conditional target to reduce its GHG emissions by as much as 30 per cent by 2020 below the 1990 level. This target is conditional on other developed countries committing to a comparable target and developing countries contributing adequately under a new global climate change agreement. Also, the EU-27 has set a 2050 target for a reduction in GHG emissions of 80–95 per cent compared with 1990 levels. The ERT noted that the EC proposes to achieve this long-term target mainly through domestic actions. Long-term modelling shows that with current policies, emissions are expected to reach 40 per cent below the 1990 level by 2050. A key challenge in achieving this target includes the provision of sufficient investment in power generation systems and electricity network infrastructure to ensure continuity of supply and the technological innovation required in the transport and industrial sectors. Table 4 and the figure below summarize the GHG emission projections in the EU.

97. The most recent projections provided by sector indicate that with existing measures, emissions will decrease between 2010 and 2020 in the main emitting sectors, except for the transport and industrial sectors. The largest reductions are expected to occur in the energy supply sector from the continued switching of electricity generation from coal to gas and an increase in the use of renewable energy.

98. Emissions from transport are expected to increase slightly in the period to 2020, due to growth in transport volumes, both passenger and freight, and a trend towards larger vehicles. The resulting increase in GHG emissions is slightly offset by some PaMs currently being planned that aim at shifting to less carbon intensive modes of transport. The projections show a continuation of a declining trend in emissions from agriculture due to increased productivity, decreased livestock, declines in emissions from agricultural soils and declining fertilizer use. The ERT noted the limited discussion of sectoral projections presented in the NC5 and encourages the EU to provide this information in its next national communication.

Greenhouse gas emission trends and projections for the EU-15 and the EU-27



Sources: (1) Data for the years 1990–2010: the European Union's 2012 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry (LULUCF); (2) Data for the years 2011–2020: the European Union's fifth national communication and updated projections provided by the European Union to the ERT during the review; the emissions are without LULUCF.

Notes: (1) Although the EU-15 projections will cease to be relevant after the Kyoto Protocol's first commitment period, since any new commitment will be taken by the EU-27, for information purposes the graph presents GHG emission projections for the EU-15 for 2012–2020; (2) The EU-27 2020 target is calculated compared with 1990 GHG emissions level. However, the year 1990 is not legally the base year for all EU-27 member States under the Convention.

Abbreviations: EU-15 = Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland; EU-27 = the EU-15 and the following countries: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia; GHG = greenhouse gas, NC5= fifth national communication, WAM = with additional measures, WEM = with existing measures, WOM = without measures.

3. Total effect of policies and measures

99. In the NC5, the EU presented the expected total effect of implemented and adopted PaMs in accordance with the 'with measures' definition, compared with a situation without such PaMs. Information is presented for member States as GHG emissions avoided or sequestered, on a CO_2 eq basis for 2010, 2015 and 2020.

100. However, the ERT noted that the EU did not provide the estimated total effect of implemented and adopted PaMs for the years 1995, 2000 and 2005. The Party explained that there were insufficient data from member States to derive this estimate for the EU. The Party further explained that there is a capacity-building programme under way to help member States to improve and to harmonize the way they estimate the effect of PaMs. Acknowledging that time is needed to design and implement a robust monitoring system of the effects of PaMs, the ERT recommends that the EU report the total effect of PaMs for the years 1995, 2000 and 2005 in its next national communication.

Table 4
Summary of greenhouse gas emission projections for the European Union

	Greenhouse gas emissions (Tg CO_2 eq per year)	*Changes in relation to base year level (%)*	*Changes in relation to 1990 level (%)*
EU-15			
Inventory data 1990[a]	4 249.3	–	–
Inventory data 2010[a]	3 797.6	–11.0	–10.6
Kyoto Protocol base year[b]	4 265.5	–	–
Kyoto Protocol target[b]	3 924.3	–8.0	–7.6
NC5 'with measures' projections for 2010[c]	3 946.0	–7.5	–6.8
NC5 'with additional measures' projections for 2010[c]	3 873.0	–9.2	–8.5
Updated 'with measures' projections for 2012[d]	3 773.0	–11.5	–11.2
Updated 'with additional measures' projections for 2012[d]	3 681.3	–13.7	–13.4
EU-27			
Inventory data 1990[a]	5 583.1	–	–
Inventory data 2010[a]	4 720.1	–18.2	–15.5
Base year[e]	5 767.2	–	3.3
NC5 'with measures' projections for 2020[c]	5 208.0	–	–4.7
NC5 'with additional measures' projections for 2020[c]	4 771.0	–	–12.7
Updated 'with measures' projections for 2020[d]	4 509.6	–21.8	–19.2
Updated 'with additional measures' projections for 2020[d]	4 177.1	–27.6	–25.2

[a] *Data source*: The European Union's May 2012 greenhouse gas (GHG) inventory submission; the emissions are without land use, land-use change and forestry (LULUCF).

[b] *Data source*: Based on the initial review report contained in document FCCC/IRR/2007/EC.

[c] *Data source*: Projections as presented in the NC5, based on the latest annual submission at the time of the NC5 preparation (2009 annual submission). 1990 GHG emissions level as in 2009 annual submission has been used to calculate the changes in relation to the 1990 level (%).

[d] *Data source*: Updated projections are from the European Environment Agency *Greenhouse Gas Emission Trends and Projections in Europe 2011*; the projections are for GHG emissions without LULUCF.

[e] *Data source*: European Commission staff working paper accompanying the document *Report from the Commission to the European Parliament and the Council: Progress Towards Achieving the Kyoto Objectives*, Brussels, 7.10.2011, SEC(2011) 1151 final. The sum of the base year emissions for EU member States in the first commitment period of the Kyoto Protocol = 5 767.2 Tg CO_2 eq per year.

Abbreviations: EU-15 = Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland; EU-27 = the EU-15 and the following countries: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia; NC5 = fifth national communication.

101. The NC5 presents the total effect of PaMs derived by two approaches, bottom-up and top-down. The bottom-up approach aggregates the estimates of member States' emissions, while the top-down approach derives the effect by taking the difference between

the 'without measures' scenario and the 'with measures' scenario. The ERT notes that the proposed MMR requires member States to report on projections, the effect of PaMs and supplementarity on an annual basis as well as to include both expected and actual effects of measures. The MMR proposal, like the current MMD, aims to improve the transparency, accuracy, consistency and completeness of member State reporting of GHG emissions and other relevant climate information.

102. In its NC5, the EU reported that the estimated total effect of implemented and adopted PaMs for the EU-15 in 2010, calculated as emission savings from the 'without measures' scenario, is between 94 Mt CO_2 eq (top-down approach) and 267 Mt CO_2 eq (bottom-up approach). According to the information reported in the NC5, PaMs implemented in the energy sector will deliver the largest GHG emission savings, followed by the PaMs implemented in the transport and industrial processes sectors. The most effective PaMs and drivers behind GHG emission reductions are described in chapter II.B.2 and II.B.3.

103. Table 5 provides an overview of the updated total effect of PaMs by sector estimated in 2011 using the bottom-up approach as provided by the EU during the review. The EU-15 updated effects for 2010 are in line with the analysis provided in the NC5, with a total estimated effect of implemented, adopted and planned PaMs of about 198 Mt CO_2 eq. At the sectoral level, the energy sector delivers about 75 per cent of savings, followed by the transport sector (13 per cent), and the industrial processes, agriculture and waste sectors accounting for the remaining 12 per cent. For the EU-27, the projected total GHG emission savings from implemented, adopted and planned PaMs in 2020 are expected to be around 965.3 Mt CO_2 eq. The energy sector is expected to deliver about 79 per cent of total savings, followed by the transport sector (15 per cent of total savings), which reduces emissions relatively more in 2020 than in 2010 for the EU-15. The remaining sectors' GHG emission savings are expected to represent about 6 per cent of total savings by all PaMs.

104. The ERT notes that the proposed MMR provisions are expected to improve member States' reporting on the total effect of PaMs as well as reporting of the estimation for the EU as a whole. The ERT encourages the EU to continue to report on its work with member States to improve the estimation of the total effect of PaMs.

4. Supplementarity relating to mechanisms pursuant to Articles 6, 12 and 17

105. The EU in its NC5 provided sufficient information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol are supplemental to domestic action. The NC5 defined supplementarity as the use of credits from the Kyoto Protocol mechanisms that does not exceed 50 per cent of the EU-wide reductions from sectors currently covered by the EU ETS over the period 2008 to 2012 and 50 per cent of the EU-wide reductions below the 2005 levels of emissions stemming from aviation over the period 2013 to 2020, to comply with the supplementarity requirement of the Kyoto Protocol.

106. The NC5 reported that the EU-15 expected use of the Kyoto mechanisms (including international emissions trading, JI and the CDM) amounted to approximately 93.1 Mt CO_2 eq per year of the commitment period. Information updated in 2011 on the use of the Kyoto mechanisms suggests that the expected use has increased to approximately 108.4 Mt CO_2 eq per year. As a share of the target for the EU-15 of an 8 per cent reduction from base year emissions, the planned use of the Kyoto mechanisms accounts for approximately 2.5 percentage points of the EU-15 reduction commitment and, hence, the EU considers that it meets its definition of supplementarity.

107. In accordance with the EU linking directive,[34] companies that participate in the EU ETS can meet their emission reduction targets by reducing emissions and/or by acquiring carbon credits from the market. Companies participating in the EU ETS can use up to 278 Mt CO_2 eq per year of carbon credits, which is 13.4 per cent [35] of the EU-wide cap. The overall use of carbon credits by the member States and by EU ETS companies, therefore, is not expected to exceed 18.6 per cent of the EU-wide cap (386.4 Mt CO_2 eq), which is less than the 50 per cent threshold used by the Party to define supplementarity. EU member States have allocated approximately EUR 2.8 billion for the development of JI and CDM projects and the purchase of carbon credits in 2008–2012.

Table 5
Projected effects of planned, adopted and implemented policies and measures in 2010 and 2020 for the European Union

	Effect of implemented and adopted measures (Mt CO_2 eq)	*Relative value (% of 1990 emissions)*	*Effect of planned measures (Mt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of implemented and adopted* measures *(Mt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (Mt CO_2 eq)*	*Relative value (% of 1990 emissions)*
Sector	*EU-15 – 2010*				*EU-27 – 2020*			
Energy (without CO_2 from transport)	135.5	5.2	20.9	0.8	507.67	14.4	253.4	7.2
Transport – CO_2	25.9	3.7	0.4	0.1	100.8	13.0	45.3	5.8
Industrial processes	8.4	2.4	0.0	0.0	22.1	4.8	1.2	0.3
Agriculture	2.9	0.7	0.0	0.0	11.7	2.0	5.6	0.9
Waste management	3.4	2.0	0.6	0.4	16.6	8.2	0.8	0.4
Total	**176.1**	**4.2**	**22.0**	**0.5**	**658.9**	**11.8**	**306.4**	**5.5**

Source: Data provided by the European Union during the review; the projections are for greenhouse gas emissions without land use, land-use change and forestry.

Note: These estimated quantified savings do not include the effects of cross-cutting measures, which cannot be allocated to specific sectors.

Abbreviations: EU-15 = Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland; EU-27 = the EU-15 and the following countries: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

108. Also, the member States can make use of removal units from activities under Article 3, paragraphs 3 and 4, to reach their Kyoto Protocol targets. Net sequestration from afforestation, reforestation and deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol is expected to amount to removals of 8.9 Mt CO_2 eq annually. The use of activities under Article 3, paragraph 4, is expected to contribute to a removal of 27.7 Mt CO_2 eq annually and, when accounting for additional contributions from EU-27 members states other than in the EU-15, this amounts to 35.5 Mt CO_2 per year. When added together, the EU-15 activities under Article 3, paragraphs 3 and 4, are projected to reduce emissions

[34] Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.

[35] Approved JI/CDM limit (per cent of allocation) according to an approved to national allocation plan.

by about 40.2 Mt CO_2 eq annually during the commitment period. This is equivalent to almost 1 per cent of the EU-15 GHG emission reductions commitment. Reflecting the results from the most recent GHG inventory submission, this estimate has declined slightly compared with the values of 41.2 Mt CO_2 eq reported in the NC5.

D. Vulnerability assessment, climate change impacts and adaptation measures

109. In the NC5, the EU has provided detailed information on the expected impacts of climate change on forests, agriculture, soil, human health, animal and plant health, biodiversity and ecosystems, water resources, marine environment, coastal zones and fisheries. The scope of the NC5 includes vulnerability of, and impacts on, sectors that were not mentioned in the NC4, for example, marine environment and fisheries, and soil. A notable progress in the vulnerability assessment since the NC4 is the inclusion in the NC5 of the impacts of climate change on employment. Overall, the accounts in the NC5 on vulnerability assessment, climate change impacts and adaptation measures reflect the considerable progress made since the NC4. Finally, the EU addressed in the NC5 all the issues that were raised in the IDR report of the NC4.

110. However, the ERT noted that the NC5 did not provide information on the vulnerability to climate change and the impacts of climate change on the economy, urban areas and infrastructure. Information to that effect was provided by the EU during the in-country review. Moreover, the ERT noted that the NC5 did not provide information on the vulnerability of the EU to climate change with regard to food security. The ERT encourages the EU to provide information on its vulnerability and adaptation to climate change with regard to its food security, infrastructure and economy. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC5.

Table 6
Summary of information on vulnerability and adaptation to climate change

Vulnerable area	*Examples/comments/adaptation measures reported*
Agriculture	*Vulnerability*: Observed increase in the length of the growing season of several agricultural crops in the northern latitudes while the length decreased in southern latitudes. Increased variability in crop yields. Increased water demand in the Mediterranean region *Adaptation*: Rural Development Policy; Common Agricultural Policy Health Check; effort sharing decision; renewable energy directive; nitrates directive
Biodiversity and natural ecosystems	*Vulnerability*: Projections up to the late twenty-first century suggest plant species will shift several kilometres north. Projections indicate that approximately 60 per cent of mountain plant species will face extinction *Adaptation*: Natura 2000; the EU Biodiversity Strategy to 2020 (2011); birds directive; habitats directive
Employment	*Vulnerability*: Even moderate climate change will affect economic activity and employment in Europe. Climate change policies to adapt to and mitigate climate change will have a small net positive effect on employment *Adaptation*: Not included
Soil	*Vulnerability*: Expected biophysical changes in soil are due to rising temperatures, changing precipitation intensity and frequency, and more severe droughts *Adaptation*: The proposed soil directive
Marine environment,	*Vulnerability*: Severe impacts on biotic and abiotic conditions of the seas are expected, including

Vulnerable area	*Examples/comments/adaptation measures reported*
coastal zones and fisheries	more frequent coastal flooding, increased acidification of the marine environment and changes in distributions of fish stocks *Adaptation*: Marine strategy framework directive requires the achievement of good environmental status of the European Union's marine waters by 2020. The Roadmap for Maritime Spatial Planning will incorporate adaptation to climate change in maritime and coastal management
Forests	*Vulnerability*: Forest areas are projected to contract in the south and expand in the north by the late twenty-first century. Projections show that there will be substantial shifts in the distribution of vegetation in forest locations. There is an anticipated increase in pest populations and forest fires *Adaptation*: The EU Forest Strategy; EU Forest Action Plan (2007–2011); EC Rural Development Policy (2007–2013)
Human health	*Vulnerability*: Heatwaves, vector-borne and food-borne diseases are expected to be more common. In 2003, heatwaves accounted for the excess loss of at least 70,000 people in 12 European countries *Adaptation*: Main policy actions to be taken by member States. EU Health Strategy (COM 2007) 630 could address, together with WHO and EU agencies, ways of ensuring adequate surveillance, and control of the impact of climate change on health and the effects of extreme events
Animal and plant health	*Vulnerability*: Observed and projected behavioural and health changes in plant and animal species. These include increase in the length of the growing season of several agricultural crops in northern latitudes, shortening of the growing season in the southern latitudes. It is projected that between one fifth and one third of European species could be at risk of extinction if global mean temperatures rise by more than 2 to 3 ^{o}C above pre-industrial levels *Adaptation*: The Community Animal Health Strategy aims to prioritize disease control, improve data gathering and step up existing animal disease surveillance
Infrastructure and economy	*Vulnerability*: Not determined/assessed *Adaptation*: The EU environmental impact assessment directive (97/11/EC) and the EU strategic environmental assessment directive (2001/42/EC) ensure that the environmental implications of projects and public plans and programmes are identified and mitigated before planning consent is given. The Trans-European Network for Transport programme policy review and Trans-European Energy Networks methodologies will be developed for climate-proofing infrastructure projects and these could be incorporated into the TEN-T and TEN-E guidelines. Guidance on how to climate-proof investments and measures under the EU Cohesion Policy could be developed Green Paper entitled *Towards a Secure, Sustainable and Competitive European Energy Network* (COM (2008)782)

Abbreviations: EC = the European Commission, EU= the European Union, WHO = the World Health Organization.

111. The NC5 provided a balanced assessment of both vulnerability and adaptation, including information regarding the integration of the net impacts across sectors and regions as well as an integrated assessment of risk across the EU. The EU Cohesion Policy (2014–2020) and the Climate-proofing Programme reported in the NC5 are some of the related ongoing projects within the EU. During the review week, the EU informed the ERT of the ongoing implementation of the White Paper on Adaptation (first phase: 2009–2012) and provided a road map towards the adoption of a more comprehensive Adaptation Strategy (March 2013). Furthermore, the EU has put in place innovative methods to make the information on vulnerability, and impacts and measures related to climate adaptation easily accessible to all member States. For example, the Climate-ADAPT project is an

interactive web-based tool on adaptation to climate change that provides information to EU policymakers to assist them in designing adaptation PaMs at the national, regional and local levels.

112. The ERT noted that the EU expects to broaden and deepen its understanding of climate risks in different sectors through already completed research projects (for example ClimateCost) and ongoing research projects (for example PESETA II). The ERT encourages the EU to provide more information in its next national communication on the methods and indicators used to determine vulnerability and adaptation.

113. The information provided during the review showed that the integration or mainstreaming of climate change adaptation into EU policies has progressed in a number of sectors, including in agriculture, environment, health and disaster reduction. Mainstreaming adaptation through the Cohesion Policy has led to the funding of a large number of adaptation-related projects under the European Territorial Cooperation objectives. These include projects on flood and fire prevention, decreasing risk in mountain forests and coping with natural hazards. The LEADER Programme is one of the programmes that also supports adaptation actions at the regional level.

114. The NC5 provided a comprehensive report on the cooperation of the EU with developing countries and its contribution to the Nairobi work programme on impacts, vulnerability and adaptation to climate change. During the review, the EU provided further information on its cooperation with developing countries. These include policy documents (for example, Agenda for Change (2009) and Environment Integration Strategy (2009)). The cooperation of the EU with developing countries on adaptation covers a wide scope in terms of sectors and number of developing countries. The EU may wish to include in the next national communication information on the progress of support programmes and projects in its cooperation with developing countries.

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

115. The information provided in the NC5 on the provision of financial resources includes most of the information required by the UNFCCC reporting guidelines and decision 15/CMP.1. The ERT noted that the EU did not define explicitly which financial resources are defined as "new and additional". During the review week, the EU clarified that financial resources provided since publication of the NC4 are considered to be "new and additional". The ERT recommends that the EU include a clear indication of what "new and additional" financial resources it has provided in its next national communication.

116. The EU provided details on 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. The information provided in the NC5 covers financial resources allocated for climate change from public sources and channelled via bilateral, regional and multilateral channels as well as to the secretariat, and the funds of the Convention.

117. The ERT noted an increasing trend in the financial resources provided to climate-related actions in the countries outside the EU from EUR 124 million in 2002 to EUR 763 million in 2010 (or from a 2.3 per cent share of official development assistance (ODA) in 2002 to 9.0 per cent of ODA in 2009). Overall, the EU has provided EUR 3.3 billion to climate-related projects in developing countries, as defined by DAC (Development Assistance Committee), through traditional ODA since 2002. This support has to a large

extent been focused on energy (supporting both renewable and efficiency measures), forestry, and adaptation measures in the area of biodiversity and disaster risk reduction, and is allocated mainly to neighbouring countries aimed at enhancing cooperation with the EU and accession to the EU. Parties not included in Annex I to the Convention (non-Annex I Parties) and Parties included in Annex I to the Convention (Annex I Parties) with economies in transition also received financial assistance for climate-related activities.

118. The NC5 reports financial resources to a number of non-Annex I Parties and indicates that its policies and programmes for climate change are designed to give particular priority to least developed countries (LDCs). The NC5, however, did not provide detailed information on the funds allocated or disbursed to LDCs or specific measures or programmes to assist these countries to meet their cost for adaptation. The NC5 did indicate, though, that to assist the EU in meeting this reporting requirement a study is being conducted to better understand adaptation cost in developing countries and how the EU can best direct its resources. The ERT encourages the EU to provide more detailed information on support for LDCs in its next national communication.

119. Financial resources for developing countries, including LDCs, are channelled mainly via the ODA-related European Development Fund. Further support to the LDCs is provided via other ODA-related agencies, such as the Development Cooperation Initiative and the European Neighbors Programme.

120. Since the NC4, the EU has taken steps to develop several climate-focused support programmes. These include the Global Climate Change Alliance, the EU and Africa, Caribbean, Pacific (ACP EU) Energy Facility, the Global Energy Efficiency and Renewable Energy Fund (GEEREF), the Africa-EU Renewable Energy Cooperation Programme in the framework of the Africa-EU Energy Partnership and a programme to engage the private sector. These programmes have been considered successful and have been replenished for a subsequent budgeting period. The EU estimates that these programmes will leverage around EUR 14 billion in climate finance by the end of 2013 by further pooling more than EUR 1.5 billion in grants from the EC and EU member States' budgets.

121. Since the NC4, the EC has made considerable efforts to further refine the methods to distinguish climate finance elements within ODA by refining indicators used in the NC4. Significant capacity-building efforts and institutional rearrangements have been undertaken to facilitate the increased focus on programming climate change financing. The ERT noted enhanced application of the Organisation for Economic Co-operation and Development (OECD) Rio Markers for adaptation and mitigation since 2008. Yet, the ERT noted that the broad criteria set for the markers may result in uncertainties in assessing the amounts of climate-related funds. It is especially challenging to assess the impact of mitigation projects and programmes implemented using financial resources provided and there is a need for further institutional capacity-building within the relevant EU institutions. Furthermore, the DG CLIMA has been developing new financial resources for reporting and monitoring criteria through the MMR (see para. 43 above). If adopted, the MMR will provide for more detailed and more frequent reporting on financial resources in subsequent national communications.

122. The ERT recommends that the EU enhance the transparency of its reporting on financial resources through: (a) streamlining the chapter by emphasizing specific climate finance instead of ODA; (b) highlighting key channels and programmes; and (c) clarifying the following: the scope of the source of financial resources (EU budget or member States' budget), the share of technology transfer in financial resources, the extent of climate elements within the pre-accession funds, and the institutional arrangements for channelling of climate financial resources. The ERT encourages the EU to improve the structure of the

section on financial resources by providing more information in tabular and graphical format and focusing on the climate-oriented actions.

123. Also, the EU may wish to consider in the next national communication: (a) presenting the data on finance by clearly identifying the funds allocated to mitigation, adaptation, capacity-building and technology transfer; (b) specifying the allocated and disbursed financial resources; and (c) identifying clearly the funds for development assistance that is complimentary to climate activities. Also, the EU may wish to consider reporting on the effectiveness of the use of its financial resources and the efficiency of the delivery (percentage of the funds that reach the recipient countries and impacts of the financial resources). In particular, an assessment of the impacts of financial resources provided may be conducted using the methods of other international processes such as the Global Environment Facility. Table 7 summarizes the information on financial resources and technology transfer.

Table 7
Summary of information on financial resources and technology transfer for 2004–2010

	Years of disbursement						
Channel of financial resources	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Official development assistance, EUR million	34 757	45 331	47 668	45 707	50 023	49 094	53 457
EU commitments on climate change related actions	171	200	261	491	404	839	771
Development Cooperation Initiative	IE	IE	IE	IE	284	246	330
European Neighbourhood and Partnership Instrument	IE	IE	IE	IE	63	39	238
European Development Fund	IE	IE	IE	IE	56	554	203
Contributions to multilateral institutions and programmes, EUR million	51.3	23.2	48.0	52.3	NA	NA	NA
Among the above, to the funds under UNFCCC	0.55	0.95	2.15	4.25	NA	NA	NA

Sources: (1) Organisation for Economic Co-operation and Development, 2012, MEMO/12/243, 12 April 2012; (2) Data provided during the review; commitments for 2010 (EUR 771 million) includes EUR 50 million for fast-start finance. The European Union commitments on climate change related actions for 2004–2007 could not be disaggregated on an annual basis, thus only an aggregated number is reported in the table; (3) The fifth national communication.

Abbreviations: EU = European Union, IE = included elsewhere, NA = not available.

124. As regards fast-start finance, the EU and its member States committed to provide EUR 7.2 billion over 2010–2012.[36] In 2010 and 2011, EUR 4.59 billion has been distributed to developing countries via ODA channels and soft loans. As presented by the EU during the review, in 2011, 50 per cent of the EU fast-start finance was allocated to mitigation, 32 per cent to adaptation, 13 per cent to reducing emissions from deforestation and forest degradation in developing countries and the remaining 5 per cent was yet to be allocated. Funding instruments for fast-start finance includes a combination of grants and loans, with grants increasing from 45 per cent in 2010 to 63 per cent in 2011 of the total mobilized funding. The loans are offered on highly concessional terms and may include a

[36] The fast-start finance represents funding provided by the EU and its member States (note that the NC5 presented financing provided by the EU only and not its member States).

grant element of up to 75 per cent. The ERT noted that these financial resources clearly represent "new and additional" financial resources allocated to climate change since the NC4.

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

125. The EU provided all of the required information in accordance with the UNFCCC reporting guidelines and decision 15/CMP.1, including information on the channels of delivery, 'hard and soft' technology and examples of types of projects and programmes. The EU also provided a clear description of trends in technology transfer during and beyond the NC5 reporting period and information on programmes to include the private sector as beneficiaries of technology transfer.

126. The amount of financial resources allocated to technology transfer in most cases could not be completely distinguishable from that of climate financial resources and/or ODA (see table 7). The ERT acknowledges that to a considerable extent, technology transfer cannot be separated from the relevant development cooperation activities; thus, most of the financial resources for climate-related technology transfer was programmed via ODA channels.

127. The NC5 presents funds for technology transfer via dedicated channels such as the EC Framework Programmes, Strategic Technology Plan, Near Zero Emission Power Generation Technology, the European Energy Technology Platforms, the Joint International Research and Development Project and the ACP EU Energy Facility. These programmes provided technology transfer funding opportunities for many issues including climate and the environment, and the funds are delivered to developing countries via multilateral and bilateral channels. The CDM is considered as one of the distinct channels of climate technology transfer.

128. The ERT noted that in the NC5 the EU reported on its activities to involve the private sector in technology transfer to developing countries. The private sector was mainly engaged in activities in relation to transfer of climate-friendly technology through the CDM and a smaller amount directly through the dedicated facility, GEEREF. The GEEREF provides funding for key sectors of the economy that are energy intensive and which present opportunities for significant GHG reduction. This facility is still being developed with pilot studies being conducted in Brazil, China and Mexico.

129. The NC5 provided several success stories on activities related to technology transfer. For example, the Results Orientated Monitoring Mechanism, which has been applied to assess the results of the technology transfer projects including GHG emission reduction.

130. The ERT noted that the funding for technology transfer increased since the NC4. The NC5 indicated that most of the financial resources were used for the transfer of 'soft' environmentally sound technology (e.g. primarily capacity-building). The ERT further noted a trend towards the transfer of 'hard' environmentally sound technology (primarily equipment and devices) mainly via the ACP EU Energy Facility and for mitigation (up to 2007 this facility has allocated EUR 196 million for projects in LDCs). In the NC5, particular attention was given to renewable energy programmes that provided renewable energy to rural communities that would not otherwise have access to the grid.

F. Research and systematic observation

131. The EU has provided information on its actions relating to research and systematic observation, and addressed both domestic and international activities. The fully integrated Europe-wide Seventh Framework Programme for Research and Technological Development (FP7) (2007–2013) is a cornerstone of European funding for research and development which promotes collaborative research by transnational consortia of industry, academia and research organizations. FP7 is structured around four specific programmes promoting transnational cooperation (collaborative research), capacity-building for research, individual fellowships (Marie Curie Actions) and frontier research (through the European Research Council). With a total budget allocation of EUR 53.2 billion, FP7 increased by about 65 per cent relative to the Sixth Framework Programme in average annual terms. It is estimated that between 15 and 20 per cent of the total FP7 funding is allocated to climate change related topics. The priorities for climate change collaborative research are to understand better the evolution through time and the processes of climate change; to quantify climate change impacts on humans and nature; and to identify and assess mitigation and adaptation options. International cooperation, particularly with developing countries, is fully integrated into all elements of FP7.

132. Other major programmes which are relevant for research and systematic observation include: LIFE+, the Financial Instrument for the Environment 2007–2012; the Competitiveness and Innovation Framework Programme; and the development cooperation instruments of the EU. Internationally, the EU participates in activities within the Convention process, the Intergovernmental Panel on Climate Change (IPCC), the International Geosphere–Biosphere Programme (IGBP), the Group on Earth Observation (GEO), the Global Earth Observation System of Systems (GEOSS), the Earth System Science Partnership, the World Climate Research Programme, the International Human Dimensions Programme and Diversitas International Programme of Biodiversity Science.

133. During the review, the EU provided the ERT with further information on the ongoing implementation of FP7 and other relevant activities at the European level. The agencies involved in its operation include the DG for Research and Innovation (DG RTD), the Joint Research Centre, the DG for Enterprise and Industry, the EEA, the European Space Agency and the European Organisation for the Exploitation of Meteorological Satellites. Climate change has been on the agenda since the first Framework Programme and is expected to continue to be a priority as part of a new programme called Horizon 2020 (2014–2020). Horizon 2020 will integrate research and innovation and bring together the Framework Programme for Research and Technological Development, the Competitiveness and Innovation Framework Programme and the European Institute of Innovation and Technology (EIT). The emphasis of Horizon 2020 will be on grand societal challenges through the promotion of larger sectoral initiatives, supporting policy development, and coupling research to innovation. In addition to a specific challenge on "Climate action, resource efficiency and raw materials" climate change research is proposed to be largely mainstreamed across the entire Horizon 2020 programme and will be a part of the EIT through the Climate Knowledge, Innovation and Community programme.

134. During the review, the EU provided the ERT with additional information, namely on the Open Access Pilot in FP7 initiative carried out by the DG RTD, whereby there is open access to knowledge generated by FP7-funded projects under several themes, including environment and climate change. In addition to the standard public access to many project deliverables, the pilot aims to allow easy and free access to scientific information, in particular peer-reviewed scientific articles published in journals within an embargo period of no more than six months. The ERT encourages the EU to report in its next national

communication on the opportunities and challenges to free and open international exchange of data and information and report on actions taken to overcome identified barriers. The ERT also encourages the EU to structure the extensive information on the research and systematic observation in a more effective fashion.

135. The EU also provided additional information on the resources provided to systematic observation through the GEO and GEOSS activities as part of the actions of the Global Climate Observing System (GCOS). The EU identified the Global Monitoring for Environment and Security Initiative as its main contribution to GEO/GEOSS. Under this initiative, the EC is putting in place operational services to produce long time series and consistent data sets for climate derived from observations and their reanalysis. The ERT learned that the GEO voluntary partnership of governments and international organizations plenary is chaired by the EC, South Africa, the United States of America and China. The GEO climate-related projects included coverage of carbon modelling data exchange and synergetic utilization, uncertainty reductions in carbon balance over land and sea, integration of different carbon models and data, first global assessment of CH_4 and reanalysis of past data across the world through the European Reanalysis of Global Climate Observations programme, among others.

136. The NC5 also reflected actions taken to support international scientific and technological cooperation through research networks and capacity-building in developing countries under the Capacities programme. In addition to specific bilateral cooperation activities, such as recent climate-focused initiatives in partnership with countries such as India, Brazil and the Russian Federation, capacity is built through multilateral platforms such as the Network for the Coordination and Advancement of Sub-Saharan Africa-EU Science and Technology Cooperation (2008–2011); the EU-Latin American Research and Innovation Networks (2008–2012); the EU Caribbean Research and Innovation Networks (2010–2014); and Enhancing Scientific Cooperation between the EU and Central America (2009–2013). Under the Capacities programme, the EU also funds a range of activities to strengthen research infrastructure to enable research into a number of environmental issues, including climate change (see, for instance, the Infrastructure for the European Network for Earth System Modelling. Through its People programme and its Marie Curie Actions, the EU also funds career development and international mobility of researchers, including several initiatives in the field of climate change research involving researchers from over 130 nationalities. The EU has also provided a summary of its GEO and GEOSS activities under GCOS, primarily based on a submission made by it to the secretariat in 2008.

137. The EU revealed its openness to international collaborations and capacity-building. The average size of a research consortium is about 15–20 partners; it offers funding opportunities for developing countries and countries with economies in transition similar to EU and associate countries. Overall, the trend has been an increasing shift towards multidisciplinary projects with enhanced emphasis on socioeconomic research. Among the most recent EU-funded research activities on which the EU provided additional information, the ERT noted the following projects: IMPACT2C is a project quantifying the projected impacts under 2 °C warming and the related adaptation needs; in response to one of the knowledge gaps identified by the IPCC in its Fourth Assessment Report, PAGE21 aims to understand and quantify the vulnerability of permafrost environments to changing global climate and investigates the feedback mechanisms associated with increasing GHG emissions from permafrost zones; on emerging issues, the Reducing Emissions from Deforestation and Forest Degradation through Alternative Landuses in Rainforests of the Tropics (REDD-ALERT) and the Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks (IREDD+) projects seek to quantify GHG emissions and removals in tropical forests and peatlands, to develop and test monitoring, reporting and verification systems and to assess the costs and benefits of REDD policies that also include the role of conservation, sustainable management of

forests and enhancement of forest carbon stocks policies for livelihoods at the local community level. The ERT further noted a portfolio of projects aiming at improving Earth system modelling and climate change projections, investigating interactions between air quality and climate change; studying oceans-climate interactions (e.g. ocean acidification, sea level rise, etc.); and supporting the development of mitigation and adaptation policies.

G. Education, training and public awareness

138. In the NC5, the EU provided information on its actions related to education, training and public awareness at the international and EU levels, including activities and best practices by its member States. Compared with the NC4, the Party provided more extensive information on education, training and public awareness, including cooperation with developing countries, public awareness campaigns, learning programmes, web-based information tools and public surveys to monitor awareness of climate change.

139. Within the EU, formal education and training is the responsibility of member States and, as such, the activities of the EU consist of supporting member States' programmes. The Lifelong Learning Programme's main objective, as reported in the NC5, is to cooperate with member States to modernize their education programmes to better reflect the most important topics currently affecting the member States, including climate change. Projects reported in the NC5 targeted schools, higher education, vocational education and training and adult education. During the review week, the EU presented information on new projects developed since the NC5, for example, the MSc programme in environmental security and management offered in several languages, and also training activities targeted at local authorities and civil organizations.

140. The Intelligent Energy Europe Programme, launched in 2003, offers training to organizations willing to improve energy sustainability. Among the recent developments are new projects under the ManagEnergy initiative in vocational training, which offers tools and facilities to help share best practices and build capacity. Other new projects reported by the EU during the review week were mainly aimed at improving energy efficiency and sustainable practices in transportation and infrastructure.

141. During the review week, the EU highlighted international cooperation on education and training: the 2011–2016 World Bank Partnership for Market Readiness undertakes capacity-building activities in developing countries to help build expertise in market mechanisms. Another example is the financial contribution of the EU to help increase access to information and enhance environmental justice in the Kyrgyzstan.

142. With regard to public awareness, EU activities using all available sources of media cover a large and extensive spectrum of climate change related topics. Web-based information and tools, publications and video productions in multiple languages are offered to the EU community. Between 2005 and 2011, the EU conducted three major public awareness campaigns. These included the Sustainable Energy Europe Campaign (2005–2011), the Climate Change Campaign (2006–2009) and Climate Action Campaign–Energy for a Changing World (2007–2009). These activities benefited from a significant increase in funding and scope compared with those reported in the NC4. In 2012, the EU will launch a new EU-wide Climate Change Campaign.

143. It is not possible to establish a direct link between awareness campaigns and public opinions on climate change because many other factors can influence public opinion. Yet, in order to have a better idea of where efforts should be targeted, the EU carries out EU-wide opinion surveys on various aspects related to climate change. Results from the June 2011 opinion survey indicated that the European public was more concerned about climate change than they were in 2009 and regarded climate change as a greater worry than the

economy. In addition, Europeans considered that policies to mitigate and adapt to climate change were opportunities to create jobs and to improve the economy.

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

144. The EU has provided all 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 8 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 the information reported under Article 7, paragraph 2, is contained in the relevant sections of this report. The ERT recommends that the EU continue to provide these reporting elements in its next national communication.

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

145. The EU 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 in the NC5 and in the 2011 and 2012 annual submissions. The ERT was also provided with extensive additional information during the review on how the Party strives to implement its commitments under Article 3, paragraph 14, 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 commends the EU for the additional information provided compared with that in the NC4. The information provided is broadly transparent and complete, while being lengthy and detailed. The ERT encourages the EU to further enhance the conciseness of information presented and further improve transparency of reporting by focusing discussion on the impact of response measures on non-Annex I Parties under Article 4, paragraphs 8 and 9, of the Convention rather than on Annex I Parties, and by including in its next annual submission further information on how it gives priority to the actions taken to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol regarding the minimization of adverse impacts of response measures to climate change.

146. The NC5 reported on the promotion of biofuels, tropical deforestation [and the?] Limited Timber Import Legislation. The 2011 and 2012 submissions, and the EU during the review, provided updated information on the mandatory impact assessment in all legislative proposals and policy initiatives developed by the EC, on the renewable energy directive, which promotes the use of biofuels and biomass (see para. 53 above), on the inclusion of aviation in the EU ETS as of 2012 (see para. 39 above) and on Roadmap 2050 (see para. 38 above). The ERT noted the development of sustainability criteria for biofuels, extensive consultation with stakeholders including developing country representatives, voluntary schemes for certification of sustainable biofuels and the promotion of second generation biofuels.

Table 8
Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

Supplementary information	*Fifth national communication section(s)*
National system	4.3
National registry	4.4
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	5.2.1, 5.2.2, 6.7
Policies and measures in accordance with Article 2	5.2, 5.5.12
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	5.2.6
Article 10 (a)	4.3
Article 10 (b)	5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 7.3
Article 10 (c)	8.6
Article 10 (d)	9.1, 9.3
Article 10 (e)	10.2.10, 10.3
Financial resources	8.1, 8.2, 8.5

147. As regards the inclusion of aviation in the EU ETS, the ERT noted that given the expected growth in emissions from aviation the EU has been considering this measure since 2005 and the Aviation Group of Experts under the EC suggested this market instrument as the lowest cost option to address sector emissions. The considerations included extensive stakeholder consultations, including online consultations.

148. The EU provided information on how it gives priority, in implementing its commitments under Article 3, paragraph 14, of the Kyoto Protocol to specific actions, with certain caveats indicating that the EU was uncertain about how these actions relate to the minimization of adverse impacts and whether they address the minimization of adverse impacts in Annex I Parties. Some noteworthy initiatives include the EU-China Action Plan on Clean Coal, cooperation on CCS, and EU cooperation with Annex I and non-Annex I Parties in the Carbon Sequestration Leadership Forum.

III. Conclusions and recommendations

149. The ERT concludes that the NC5 provides a good overview of the national climate policy of the EU. The information provided in the NC5 includes most mandatory information required by the UNFCCC reporting guidelines and most elements of the supplementary information under Article 7 of the Kyoto Protocol with the exception of some information on GHG projections and the provision of financial resources. During the review, the EU provided additional information on these matters.

150. The total GHG emissions in the EU-15 decreased by 10.6 per cent between 1990 and 2010, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 11.3 per cent. The increase in GHG emissions due to growing population and transport was more than offset by the decrease in GHG emissions due to the decline in energy intensity, the restructuring of economic activity and related primary energy use, the change in trade patterns and the implementation of relevant PaMs.

151. The EU presented in its NC5 GHG projections for the period from 2007 to 2020 for the EU-15. Three scenarios were included: ‘without measures’, ‘with measures’ and ‘with

additional measures'. The projections reported in the NC5 suggest that the reduction in GHG emissions of the EU-15 in 2010 under the 'with measures' and 'with additional measures' scenarios are, respectively, 7.5 per cent and 9.2 per cent below the base year emissions level. According to projections updated in 2011, the EU-15 is expected to reduce its GHG emissions in 2012 under the 'with measures' and 'with additional measures' scenarios to levels that are 11.5 per cent and 13.7 per cent, respectively, below the base year emissions level. These projections show that the EU-15 as a group can meet its Kyoto Protocol target for the first commitment period (which is an 8 per cent reduction) through the implementation of current measures only.

152. The projections updated in 2011 for the EU-27 suggest that GHG emissions in 2020 could be decreased to levels that are 19.2 per cent below the 1990 level with implemented and adopted PaMs, and down to 25.2 per cent if all additional measures were fully implemented. The EU ETS and the ESD make the most important contributions to these expected GHG emission reductions.

153. The NC5 contains information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. The NC5 defined supplementarity as the use of credits that does not exceed 50 per cent of the Europe-wide reductions over the period 2008 to 2012. While the EU-15 as a whole could meet its target with domestic action alone, some member States are planning to make use of the Kyoto Protocol flexibility mechanisms to meet their first commitment period Kyoto targets. As a share of the target for the EU-15 of an 8 per cent reduction from base year emissions, the planned use of the Kyoto mechanisms accounts for approximately 2.5 per cent of the EU-15 reduction commitment; the EU considers that this meets its definition of supplementarity.

154. The EU climate policy is comprehensive and inclusive in terms of coverage, is applied at a multiple levels (from economy-wide targets to multisector targets under the EU ETS and ESD, and specific sector-level and subsector-level targets), and employs a wide range of policy instruments (e.g. emissions trading, technology standards and benchmarks, taxes, research and innovation). The contemporary EU climate policy is framed by the 2008 EU Energy and Climate Package that sets targets for 2020 of a 20 per cent reduction of GHGs from 1990 levels; a 20 per cent share of energy from renewable sources in final energy consumption; and a 20 per cent reduction of energy consumption below BAU. A progress assessment indicates that with existing PaMs, 20.6 per cent of energy production could come from renewable sources in 2020, which slightly exceeds the EU target; and that energy consumption will be reduced by only 9 per cent by 2020; therefore, the EC has proposed new PaMs to address the remaining gap of an 11 per cent reduction in energy consumption.

155. The primary vehicle for the achievement of the 2008–2012 Kyoto Protocol target is the EU ETS, with various PaMs to address emissions from the non EU ETS sectors (but with less predictable results than the EU ETS). The underlying policy instruments to achieve the 2020 GHG emissions level target are: the next phase of the EU ETS, covering 45 per cent of EU emissions of the 27 EU member States, including greater scope and more stringent allocation rules to reduce GHG emissions to 21 per cent below their 2005 level by 2020; and the ESD, covering the remaining 55 per cent of total emissions, based on binding annual member State targets to reduce emissions to 10 per cent below their 2005 level.

156. The implementation of EU PaMs relies on the implementation of national plans or the achievement of national-level targets by member States. This requires significant efforts on the part of the EU to implement a system of extensive monitoring and evaluation to assess progress across member States towards EU-wide targets, ensure compliance, and to evaluate the need for an additional action. The MMR is therefore a critical element of the

EU policy process and the enhancements proposed in the new draft regulation will be important to ensure alignment with the 2020 targets and strategies.

157. Financial resources allocated by the EU to support climate change actions in developing countries and countries with economies in transition have been increasing since the NC4 through to nowadays from EUR 124 million in 2002 to EUR 763 million in 2010. This was achieved through dedicated funding programmes focusing, inter alia, on renewable energy, energy efficiency, capacity-building for the development of low-carbon strategies and the development of market policies. With respect to technology transfer, there is a trend towards more support for the transfer of 'hard' environmentally sound technology to developing countries compared with the transfer of 'soft' environmentally sound technology. During the NC5 reporting period, particular attention was given to renewable energy programmes that provided renewable energy to rural communities that would not otherwise have access to the electricity grid. The application of the OECD DAC markers allowed for better distinguishing between financial resources allocated to mitigation and adaptation and the forthcoming MMR shall further enhance the accuracy of reporting on the provision of financial resources.

158. As regards vulnerability and adaptation, the EU has intensified its work on climate change adaptation and has broadened the scope of its reporting since the NC4. The EU Adaptation Strategy, based on the 2009 White Paper on Adaptation, outlines a comprehensive approach to adaptation that is to be implemented as of March 2013. The strategy's main objective is to enhance the preparedness and capacity to respond to the impacts of climate change in the EU. To facilitate the implementation of the strategy, the European Climate Adaptation Platform web-based tool on adaptation to climate change was developed. This interactive tool provides information to EU policymakers and assists them in designing adaptation PaMs at the EU, national, regional and local levels. The EU continues to position climate change, including adaptation, as a priority in its external relations and to cooperate with a great number of developing countries on a wide spectrum of sectors.

159. Research and systematic observation activities in the EU are mainly undertaken under FP7. Relative to its predecessor FP6, the funding in FP7 for climate change related research increased by about 65 per cent in line with the increase in the overall FP7 budget in average annual terms. It is estimated that between 15 and 20 per cent of total FP7 funding is allocated to climate change. In its next phase, FP7 will be joined with the Competitiveness and Innovation Framework Programme and the programmes of the European Institute of Innovation and Technology in a single Horizon 2020 programme with an increased funding relative to FP7. At the international level, the EU continues to be a major participant in the IGBP, GEO and GEOSS.

160. Although education and training are mainly the responsibilities of member States, the EU plays an active role in supporting those activities within the EU and internationally. With a wide range of topics and targeted audiences, the EU makes extensive use of all available media. Public awareness on climate change is enhanced through EU-wide and more targeted climate change campaigns and initiatives, which are informed by EU-wide public opinion surveys, the latest dating from June 2011. The next EU-wide campaign to raise public awareness is to be launched in 2012. The EU continues to be significantly involved in international cooperation on education, training and public awareness, which is at the centre of its approach to international relations.

161. The ERT concluded that the national system of the EU continues to perform its required functions as set out in decision 19/CMP.1; that the national registry continues to perform the functions set out in decision 13/CMP.1 and decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. The implementation of the MMD contributes to

improvements in consistency and accuracy of the GHG inventory, and that the forthcoming MMR will further enhance the quality of its reporting.

162. 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 is complete and transparent.

163. In the course of the IDR, the ERT formulated several recommendations relating to the completeness and transparency of the EU reporting under the Convention and its Kyoto Protocol. The key recommendations[37] are that the EU:

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

(i) Provision of the estimate of the total effect of PaMs for 1995, 2000 and 2005, and the total effect of PaMs by sector;

(ii) Clarification on the definition of "new and additional" financial resources;

(b) Improve the transparency of reporting by including in its next annual submission further information on how it gives priority to the actions taken to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol regarding the minimization of adverse impacts of response measures to climate change.

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

(a) Provide a more detailed description of legislative arrangements and administrative procedures set for the implementation of the Convention and its Kyoto Protocol;

(b) Provide further information on the effects of individual PaMs and the interaction between individual PaMs;

(c) Elaborate on the methods for monitoring and evaluation of EU-level PaMs across member States;

(d) Elaborate further on how the PaMs influence the longer-term trends, in particular in the agriculture and LULUCF sectors;

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

(f) Provide a sensitivity analysis for key assumptions used to project GHG emissions;

(g) Improve the consistency and accuracy of the assumptions made in member State projections;

(h) Elaborate on drivers for sectoral GHG projections;

(i) Provide information on vulnerability and adaptation to climate change with regard to its food security, infrastructure and economy; and on methods and indicators used to determine vulnerability and adaptation;

(j) Provide more detailed information on support for LDCs;

(k) Improve the structure of the section on financial resources by providing more information in tabular and graphical format and focusing on the climate-oriented actions;

[37] The recommendations are given in full in the relevant sections of this report.

(l) Identify the opportunities for and barriers to free and open international exchange of data and information on research and systematic observation and reporting on action taken to overcome barriers.

IV. Questions of implementation

165. 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>.

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"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>.

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FCCC/ARR/2010/EU. Report of the individual review of the annual submission of the European Union submitted in 2010. Available at <http://unfccc.int/resource/docs/2011/arr/eu.pdf>.

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FCCC/IDR.4/EC. Report of the centralized in-depth review of the fourth national communication of the European Community. Available at <http://unfccc.int/resource/docs/2009/idr/ec04.pdf>.

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2009 annual submission of the European Community: Common reporting format (CRF) tables. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php>.

2011 annual submission of the European Union (Kyoto Protocol): National inventory report. Available at: <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php>.

2012 annual submission of the European Union (Kyoto Protocol). Available at: <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php>.

B. Additional information provided by the European Union

Responses to questions during the review were received from Ms. Elina Bardram, Ms. Anne Becker, Ms. Joan Canton, Mr. Tony Carritt, Ms. Nathalie Creaste Manservisi, Mr. Arno Kaschl, Ms. Kelly Kizzier, Ms. Susanna Lindvall, Mr. Jan Nill, Mr. Asger Olesen, Mr. Jurgen Salay, Mr. Raphael Sauter, Mr. Ronald Velghe, Mr. Delano Verwey (Directorate-General (DG) for Climate Action (DG CLIMA)), Mr. Andreas Gumbert, (DG for Agriculture and Rural Development (DG AGRI)), Mr. Etienne Coyette, Mr. Paul Renier (DG Development and Cooperation), Mr. Francois Dejean, Mr. Ricardo Fernandez, (European Environment Agency), Mr. Robert Lorentz, Ms. Gergana Miladinowa, Mr. Philipp Troppmann, (DG Enterprise and Industry), Mr. Zoltan Rakonczay, Mr. Michel Sponar, Mr. Andre Zuber (DG Environment (DG ENV)), Mr. Gergely Antal Sulyok (DG Mobility and Transport (DG MOVE)), Mr. Luca Perez (DG Research and Innovation). The following documents[1] were also provided by the European Union:

European Commission. 2010. *The EU climate and energy package.* Available at <http://ec.europa.eu/clima/policies/package/index_en.htm>.

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European Commission. 2011. *Greenhouse gas monitoring and reporting.* Available at <http://ec.europa.eu/clima/policies/g-gas/documentation_en.htm#progress_reports>.

[1] Reproduced as received from the Party.

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European Commission. 2011. *International Climate Finance.* Available at <http://ec.europa.eu/clima/policies/finance/international/index_en.htm>.

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