



**Framework Convention on
Climate Change**

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

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 Germany 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 Germany the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Within the burden-sharing agreement of the European Union (EU) for meeting commitments under the Kyoto Protocol, Germany committed itself to reducing its greenhouse gas (GHG) emissions by 21 per cent compared with the base year¹ level during the first commitment period from 2008 to 2012.

2. This report covers the in-country in-depth review (IDR) of the fifth national communication (NC5) of Germany, 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 14 to 19 March 2011 in Berlin, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Ture Hammar (Denmark), Mr. Graham Sem (Papua New Guinea), Ms. Melanie Sporer (Austria) and Mr. Norbert Nziramasanga (Zimbabwe). Mr. Hammar and Mr. Sem were the lead reviewers. The review was coordinated by Ms. Barbara Muik (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 Germany 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 Germany in its 2010 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

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

B. Summary

5. The ERT noted that Germany's NC5 complies in general 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 Protocol² is provided in the NC5. Germany considered some of the recommendations provided in the report of the centralized in-depth review of the fourth national communication (NC4) of Germany.³ The ERT commended Germany for its improved reporting.

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

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

² Decision 15/CMP.1, annex, chapter II.

³ FCCC/IDR.4/DEU.

1. Completeness

7. The NC5 covers all sections required by the UNFCCC reporting guidelines and almost all of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol, except for a description of the national registry (see para. 20 below). Also, the NC5 does not include some information required by the guidelines in the sections that were reported by Germany, including the estimated total effect of the Party's policies and measures (PaMs) (see para. 68 below), a clarification of how the Party has determined financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention as being "new and additional" (see para. 94 below) and a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources (see para. 18 below). Further information on these matters was provided by Germany during the review. The ERT recommends that Germany enhance the completeness of its reporting by providing this information in its next national communication.

2. Transparency

8. The ERT acknowledged that Germany's NC5, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, is broadly transparent. The NC5 is structured according to the outline contained in the annex to the UNFCCC reporting guidelines and supplementary information submitted under Article 7, paragraph 2, of the Kyoto Protocol is easily identifiable. However, the information on financial resources and technology transfer to the least developed countries and countries most vulnerable to climate change could be more transparent. In the course of the review, the ERT formulated a number of recommendations that could help Germany to further increase the transparency of its reporting with regard to national circumstances (see para. 12 below), PaMs (see para. 26 below), projections and total effects of PaMs (see para. 68 below), climate change impacts and adaptation (see para. 93 below) and financial resources and technology transfer (see paras. 94 and 101 below).

3. Timeliness

9. The NC5 was submitted on 14 January 2010, after the deadline of 1 January 2010 mandated by decision 10/CP.13. A revised version was submitted on 11 February 2010. The ERT noted with concern the delay in the submission of the NC5.

II. Technical assessment of the reviewed elements

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

10. In its NC5, Germany has provided a description of the national circumstances and has elaborated on the framework legislations and key policy documents on climate change. The NC5 refers to the description of the national system provided in the national inventory report (NIR) of the Party's 2009 annual submission. Further technical assessment of the institutional and legislative arrangements for the coordination and implementation of PaMs is provided in chapter II.B.1 below.

1. National circumstances

11. In its NC5, Germany has provided a description of its national circumstances, as well as information on how these national circumstances affect GHG emissions and removals in Germany and how changes in the national circumstances affect GHG emissions and removals over time in the country. Information was provided on the government structure, population, geography, climate, economy and relevant economic sectors. The ERT noted that the reunification of Germany in October 1990 is the most significant event in the modern history of the country and shaped in a unique way its political, social and economic system. It also had a profound impact on the restructuring of the economy, with associated changes in the energy demand and emission levels. In addition, the success in the promotion of renewable energy sources (RES) and energy efficiency improvements significantly contributed to the decarbonization of the economy, with GHG emissions per gross domestic product (GDP) unit having been reduced by 41.7 per cent between 1990 and 2009, and influenced emission trends in Germany.

12. To improve transparency, the ERT encourages Germany to further enhance its reporting on factors affecting its GHG emissions, in order to explain the relationship between the national circumstances and its emissions and removals. The transparency of the information provided by Germany could be improved, including that on vehicle fleet composition, industrial structure, concepts and management practices of forests related to climate change, and waste composition. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

13. Germany is a federal republic (Bundesrepublik), consisting of 16 regions (Länder). Legislative competence is divided between the federal and regional levels. Competences for environmental legislation are not exclusively at the federal level, but the various areas of environmental law are subject to concurrent legislation. The Federal Government shapes environmental legislation and transposes EU directives relating to the environment into German law. The overall responsibility for climate change policymaking lies within the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and authorities at the federal, regional and local (municipalities) levels administrate the implementation of this policy. The implementation of the Kyoto Protocol is underpinned by the 2007 Integrated Energy and Climate Programme (IECP), which superseded the 2005 National Climate Protection Programme, and a significant number of PaMs are deferred to the regional level. 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 below.

14. Germany has provided a summary of information on GHG emission trends for the period 1990–2007. This information is consistent with the 2009 national GHG inventory submission. However, the ERT noted that summary tables, including trend tables for emissions in carbon dioxide equivalent (CO₂ eq), are not provided in the NC5, but a complete set of common reporting format tables was submitted separately in conjunction with the NC5. The ERT recommends that Germany, in its next national communication, report the GHG emission trend tables following the UNFCCC reporting guidelines. During the review, the ERT assessed the emissions data presented in Germany's 2010 annual submission and it has reflected the findings in this report.

Table 1
Indicators relevant to greenhouse gas emissions and removals for Germany

	1990	1995	2000	2005	2008	Change 1990–2000 (%)	Change 2000–2008 (%)	Change 1990–2008 (%)
Population (million)	79.36	81.66	82.19	82.46	82.12	3.6	–0.1	3.5
GDP (2000 USD billion using PPP)	1 732.21	1 931.18	2 132.96	2 197.16	2 351.80	23.1	10.3	35.8
TPES (Mtoe)	351.40	337.05	337.29	338.69	335.28	–4.0	–0.6	–4.6
GDP per capita (2000 USD thousand using PPP)	21.83	23.65	25.95	26.65	28.64	18.9	10.4	31.2
TPES per capita (toe)	4.43	4.13	4.10	4.11	4.08	–7.5	–0.5	–7.9
GHG emissions without LULUCF (Tg CO ₂ eq)	1 251.22	1 125.42	1 050.44	1 005.17	983.71	–16.0	–6.4	–21.4
GHG emissions with LULUCF (Tg CO ₂ eq)	1 231.06	1 103.52	1 028.38	1 040.13	1 013.90	–16.5	–1.4	–17.6
CO ₂ emissions per capita (Mg)	13.12	11.43	10.90	10.48	10.27	–16.9	–5.8	–21.7
CO ₂ emissions per GDP unit (kg per 2000 USD using PPP)	0.60	0.48	0.42	0.39	0.36	–30.0	–14.3	–40.0
GHG emissions per capita (Mg CO ₂ eq)	15.77	13.78	12.78	12.19	11.98	–19.0	–6.3	–24.0
GHG emissions per GDP unit (kg CO ₂ eq per 2000 USD using PPP)	0.72	0.58	0.49	0.46	0.42	–31.9	–14.3	–41.7

Sources: (1) GHG emissions data: Germany's 2010 greenhouse gas inventory submission; (2) Population, GDP and TPES data: International Energy Agency.

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

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

15. Total GHG emissions excluding emissions and removals from land use, land-use change and forestry (LULUCF) decreased substantially between 1990 and 2000, by 16.0 per cent, and then continued to decline at a slower rate, by 6.4 per cent, until 2008, leading to a total decrease of 21.4 per cent between 1990 and 2008. Total GHG emissions including net emissions or removals from LULUCF decreased by 17.6 per cent in the same period. This was mainly attributed to CO₂ emissions, which decreased by 19.0 per cent over that period. Emissions of methane (CH₄) also decreased, by 51.9 per cent, while emissions of nitrous oxide (N₂O) decreased by 22.3 per cent. Emissions of fluorinated gases (F-gases) accounted for about 0.9 per cent of total GHG emissions in 1990 and 1.8 per cent in 2008. Trends in total GHG emissions were mostly underpinned by GHG emission trends in the energy and waste sectors, which were driven by a shift in energy sources towards less carbon-intensive fuels (i.e. an increase of the share of natural gas and a decrease of the share of lignite in the energy supply mix), the successful promotion of RES, and a very proactive waste management policy. Analysis of drivers for GHG emission trends in each sector is provided in chapter II.B below. Table 2 provides an overview of Germany's GHG emissions by sector from the base year to 2008.

16. During the review, Germany provided recent data on GHG emissions for 2009 and preliminary data for 2010. These data show a significant decrease in total GHG emissions excluding LULUCF between 2008 and 2009, by 62 Tg CO₂ eq or 6.3 per cent, owing mainly to a decrease in CO₂ emissions from the energy and industrial processes sectors. According to German authorities, this decrease is due mainly to the effects of the recent financial and economic crisis on industrial production and energy consumption. The ERT noted that the long-term trend in total emissions is not expected to be affected by the crisis as it has only a temporary effect on emission levels, and this has been confirmed by the preliminary data for 2010. The German economy regained momentum in 2010 and, according to preliminary estimates, emissions are expected to have increased again, by 36 Tg CO₂ eq, from 2009 to 2010.

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

Sector	GHG emissions (Tg CO ₂ eq)						Change (%)		Shares ^a by sector (%)	
	1990	1995	2000	2005	2007	2008	1990–2008	2007–2008	1990	2008
1. Energy	992.42	878.69	836.09	803.30	779.11	779.87	-21.4	0.1	79.3	79.3
A1. Energy industries	419.55	360.88	351.32	366.44	378.52	357.45	-14.8	-5.6	33.5	36.3
A2. Manufacturing industries and construction	158.79	119.47	106.80	100.79	103.19	102.51	-35.0	-0.7	12.7	10.4
A3. Transport	164.59	177.95	182.45	161.18	154.21	153.91	-6.5	-0.2	13.2	15.6
A4.–A5. Other	220.17	195.97	173.60	159.82	130.20	153.47	-30.3	17.9	17.6	15.6
B. Fugitive emissions	29.32	24.41	21.92	15.08	12.99	12.54	-57.2	-3.4	2.3	1.3
2. Industrial processes	120.04	123.24	103.42	104.50	114.60	109.80	-8.5	-4.2	9.6	11.2
3. Solvent and other product use	5.46	4.52	3.78	3.46	3.38	3.38	-38.1	0.0	0.4	0.3
4. Agriculture	90.19	79.15	80.06	76.30	74.35	77.45	-14.1	4.2	7.2	7.9
5. LULUCF	-20.16	-21.90	-22.06	34.96	38.96	30.19	-249.7	-22.5	-1.6	3.1
6. Waste	43.11	39.82	27.08	17.60	14.34	13.21	-69.4	-7.9	3.4	1.3
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GHG total with LULUCF	1 231.06	1 103.52	1 028.38	1 040.13	1 024.73	1 013.90	-17.6	-1.1	NA	NA
GHG total without LULUCF	1 251.22	1 125.42	1 050.44	1 005.17	985.77	983.71	-21.4	-0.2	100.0	100.0

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

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

^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.

2. National system

17. In accordance with decision 15/CMP.1, Germany provided in its NC5 a description of how its national system performs the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1 (decision 19/CMP.1). The Party also provided a reference to its 2009 annual submission, which contains a more

detailed description of the national system. The description includes all the elements as required in decision 15/CMP.1.

18. In its NC5, Germany did not provide a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, as well as elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources. During the review, Germany explained that the Federal Forest Act (Bundeswaldgesetz) sets the overall targets and the framework for the forest laws of the Länder (Landeswaldgesetze). Both federal and regional laws contain provisions that seek to ensure that activities related to afforestation, reforestation, deforestation and forest management also contribute to the conservation of biodiversity and the sustainable use of natural resources. These provisions include targets for the conservation of biodiversity and other sustainability criteria for the administrative approval of afforestation, reforestation and deforestation activities. By establishing defined criteria, these provisions also ensure sustainable forest management, such as the protection of forest soils and the conservation and development of stable forest ecosystems that are similar to natural forests in terms of tree composition and natural dynamics. The ERT recommends that Germany include this information in its next national communication.

19. During the review, Germany provided additional information on the national system, elaborating on: the capacity of the national system; improvements to its institutional and legislative arrangements and administrative procedures for GHG inventory planning, preparation and management; and procedures for GHG emission verification. The ERT concluded that the national system continued to perform its required functions as set out in decision 19/CMP.1.

3. National registry

20. In its NC5, Germany has not provided information on the national registry, but it has provided a reference to its 2009 annual submission. The ERT noted that the information in the Party's 2009 annual submission includes only information on changes to the national registry. It does not provide complete information on the national registry, as requested by decision 15/CMP.1, including a description of how the national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and how it complies with the requirements of the technical standards for data exchange between registry systems. In response to questions raised by the ERT during the review, Germany provided the requested information. The ERT strongly recommends that the Party include, in its next national communication, information on the national registry in accordance with paragraph 32 of the annex to decision 15/CMP.1.

21. During the review, Germany provided additional information on the measures put in place to safeguard, maintain and recover registry data, the security measures employed in the registry to prevent unauthorized manipulations, the measures put in place to protect the registry against security compromises, and the test procedures related to the performance of the current version of the national registry. Germany also provided information on how changes and discrepancies related to the national registry are recorded. In response to questions raised by the ERT, Germany 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.

22. The ERT took note of the conclusion of the standard independent assessment report (SIAR) that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. Further, the ERT noted from the SIAR and its findings that the national registry has adequate security, data safeguard

and disaster recovery measures in place and that its operational performance is adequate. The national registry fulfilled the requirements regarding the public availability of information in accordance with paragraphs 45–48 of the annex to decision 13/CMP.1.

23. The ERT concluded that Germany's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1.

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

24. As required by the UNFCCC reporting guidelines, Germany has provided in its NC5 comprehensive information on its package of implemented and adopted PaMs in order to fulfil its commitments under the Convention and its Kyoto Protocol. All sectors, except for LULUCF, have their own textual description of the principal PaMs. Germany 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.

25. However, the ERT noted that Germany did not provide the following information required by the UNFCCC reporting guidelines: information on PaMs no longer in place; an explanation of the differences between the information reported in the NC4 and the NC5; information on the monitoring and evaluation of PaMs; a quantification of the mitigation effects of PaMs in the waste and agriculture sectors; a description of the PaMs influencing GHG emissions from international transport; and information on PaMs regarding forestry. The ERT also noted that the following information was included elsewhere without a reference being provided in the PaMs section of the NC5: a description of PaMs in the waste sector (chapter 2.9), summary tables on PaMs (chapter 5) and information on energy research policies (chapter 8.4) were included in other sections of the NC5; and mandatory information on PaMs was provided in an additional Excel file that was submitted together with the NC5. In addition, information on some key PaMs was not included in the NC5, nor was any reference made to information provided in the NC4.

26. Some of the recommendations made in the previous review report were taken into consideration by the Party to improve the reporting in the NC5, including: elaborating on the link between PaMs and projections; less repetition of information between the PaMs and projections chapters of the NC5; reporting direct emission reduction effects of PaMs in the energy sector also for 2015 and 2020; and providing information on the types of its PaMs. The ERT encourages the Party to increase transparency by including, in its next national communication, summary tables of PaMs by sector in the chapter on PaMs, and by moving all information relevant to PaMs to the chapter on PaMs or including references in the PaMs chapter to explanations given in greater detail elsewhere, if any. The ERT also encourages Germany to include, in its next national communication, information on: the monitoring and evaluation of PaMs; quantified emission reduction effects for all sectors; the PaMs influencing GHG emissions from international transport and the PaMs regarding forestry; the overlap between PaMs; PaMs no longer in place; and the cost of PaMs, to the extent possible.

27. In Germany, the framework for climate and energy policy is defined by the IECF, which was approved in 2007 and which superseded the National Climate Protection Programme from 2000 and 2005. The IECF established the guiding principles and framework for Germany to meet its target under the Kyoto Protocol and sets a target of a 40 per cent emission reduction between 1990 and 2020. Provisions in the IECF that are

relevant to Germany’s energy strategy were updated in the context of the German Energy Concept 2010. The key climate policy instruments and measures in Germany include: the introduction of the EU emissions trading scheme (EU ETS) in Germany as of 2005; a broad portfolio of energy taxes; other fiscal and economic incentives, such as subsidies and feed-in tariffs for RES; regulations and standards in nearly all sectors; and a strong focus on research and innovation in the energy sector. In its NC5, Germany provided comprehensive information on its PaMs at the national and regional levels, as well as in the context of the EU-wide policies.

28. The main pillars of the German climate strategy include improved energy efficiency and related energy savings, and expanded use of RES. The policy to promote RES, launched in 1991 with the introduction of feed-in tariffs for RES, was successfully strengthened through the Renewable Energy Sources Act (EEG 2000, last amended in 2008), with its guaranteed minimum feed-in tariffs for electricity production from RES. This policy was further extended to cover heat supply by the Act on the Promotion of Renewable Energies in the Heat Sector in 2008.

29. The policy to promote renewable energy was driven by ambitious targets. This includes the former minimum political target of the EEG, a 12.5 per cent share of RES in total electricity generation by 2010. This target was already surpassed in 2007, and the latest figures provided during the review show that in 2010 RES reached a share of 16.8 per cent in total electricity generation. Also included are targets for heat production (a 14 per cent share of RES by 2020) and road transport (a 5.75 per cent share of RES by 2010 and a 10 per cent share by 2020). Altogether, these ambitious targets, together with related efficient policies and instruments and legislation that provided the necessary security for the long-term planning of companies, led to a significant increase in the share of RES in total primary energy consumption in Germany, from 2.6 per cent in 1998 to 9.4 per cent in 2010.

30. In its NC5, Germany provided estimates of the effects of individual and aggregated PaMs for the energy sector, focusing on CO₂. These estimates were reported in summary tables on PaMs in the projections chapter of the NC5. The effect of synergies and overlap among PaMs at the national level was quantified and reported in the NC5, but an explanation thereof was not provided. The ERT encourages Germany to include this information in its next national communication. Table 3 provides a summary of the reported information on the PaMs of Germany.

Table 3
Summary of information on policies and measures

<i>Major policies and measures</i>	<i>Examples/comments</i>
<i>Policy framework and cross-sectoral measures</i>	
Integrated Energy and Climate Programme (IECP) 2007	Germany’s key framework for climate and energy policies and measures, which superseded the National Climate Protection Programme (2000 and 2005) (–40 per cent greenhouse gas (GHG) emissions by 2020 versus 1990 level; emission savings of 270 Mt CO ₂ eq)
Energy Concept 2010	Provisions in the IECP relevant to Germany’s energy strategy were updated and extended in the Energy Concept (–80 to –95 per cent GHG emissions by 2050 versus 1990 level)
Energy/electricity/emissions taxation	Mineral oil tax (until 2006) and electricity tax (1999 and 2006), ecological tax reform (1999, 2000, 2001, 2002 and 2003) and energy tax (2006): making energy more expensive by increasing taxes on heating fuels, motor fuels, electricity and coal; tax exemptions and reductions for certain sectors are applied in order to prevent negative impacts on international competitiveness;

<i>Major policies and measures</i>	<i>Examples/comments</i>
European Union emissions trading scheme	elimination of the natural gas tax Applies to German installations in the electricity, industry and industrial processes sectors, whose emissions account for approximately 50 per cent of the Party's total GHG emissions (15 Mt CO ₂ eq)
<i>Policies and measures by sector</i>	
<i>Energy</i>	
Combined heat and power (CHP) Act on the Preservation, Modernization and Development of Combined Heat and Power Generation (2000, 2002 and 2008)	Support for operation of existing CHP installations; promotion of modernization of existing CHP installations; expansion of electricity production in small CHP installations; market launch of fuel cells; and additional support for large new (commissioned until 2016) power stations in the industrial CHP sector and in the district-heating sector
Renewable Energy Sources Act (2000, 2004 and 2008)	Guaranteed minimum compensation for feed-in of electricity from renewable sources (-36 Mt CO ₂ eq)
Act on the Promotion of Renewable Energies in the Heat Sector (2008)	Laid down obligations to use renewable energies in new buildings (-1.5 Mt CO ₂ eq)
Energy Saving Ordinance (1997, 2002/2004, 2007 and 2009)	Promotion of energy savings by increasing energy efficiency in buildings and through tightened energy standards (-4 Mt CO ₂ eq)
Kreditanstalt für Wiederaufbau support programmes for buildings (1996, 2001, 2007 and 2009) and for promoting energy efficiency in industry and commerce, trade and services	Promotion of investments in energy savings and CO ₂ reductions (-9 Mt CO ₂ eq)
Energy sector liberalization	Deregulation of the electricity market; eco electricity labelling
Energy Efficiency Fund 2007	Special Fund for Energy Efficiency, which supports advice and consultancy programmes for small and medium-sized enterprises (-0.1 Mt CO ₂ eq)
Energy Industry Act 2008	Liberalizing electricity metering will facilitate and promote innovative metering methods and demand-related, time-variable tariffs
<i>Transport</i>	
Vehicle and fuel taxes	Ecological tax reform (1999–2003); introduction of toll system for heavy goods vehicles and further spreading of truck road tolls (2005 and 2009); reduction in distance-based tax allowance for commuters between home and work (from EUR 0.36 to EUR 0.30/km) (2006); and CO ₂ -based motor vehicle tax (2009)
Biofuel Quota Act (2006 and 2009)	Includes a reduction of the energy-based overall biofuel quota to 6.25 per cent in the period 2010 to 2015 (-10 Mt CO ₂ eq)
National Electromobility Development Plan 2008	Target of 1 million electric vehicles by 2020, which is about 5 per cent of the current car fleet, and 6 million electric vehicles by 2030
<i>Agriculture</i>	European Union Common Agricultural Policy (EU CAP); EU CAP Health Check
<i>Forestry</i>	Sustainable forest management and preserving and enlarging the country's forest area
<i>Waste</i>	Technical Instructions on Municipal Waste; Act on Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal; and Ordinance on Environmentally Compatible Storage of Waste from Human Settlements and on Biological Waste Treatment Facilities

Note: The greenhouse gas reduction estimates, given for some measures (in parentheses), are reductions in CO₂ or CO₂ eq for the year 2020.

1. Policy framework and cross-sectoral measures

31. BMU is responsible for coordinating climate change related policies at the federal (national) level. For this purpose, an inter-ministerial working group on CO₂ reduction was established in 1990 under the lead of BMU. The task of this working group is to draw up guidelines for climate protection (i.e. mitigation of GHG emissions) policy activities, to identify the need for action, to assess the potential for reducing GHG emissions and to submit to the Federal Government comprehensive packages of measures for reducing GHG emissions in Germany. Activities at the federal level are harmonized with the regions (Länder) through joint federal/regional committees, and with the local or municipality level via the central associations of local authorities.

32. Most of the Länder have established regional Climate Protection Programmes. During the review, Germany provided further information on updated climate protection activities undertaken by the Länder. A key driver of activities at the level of the municipalities has been auctioning revenues from emissions trading schemes that were directed to subsidize renewable energies and local climate programmes. By means of the National Climate Protection Initiative (2008), municipalities were encouraged to define their own contributions to the efforts of the Federal Government's climate protection objectives and to prepare and implement their own measures. To further promote these activities, a service point has been established to support the municipalities with advice on the funding programmes. The municipalities also support action taken by citizens and enterprises.

33. The NC5 did not provide a description of how the progress with PaMs is monitored and evaluated over time in Germany. During the review, Germany explained that BMU, as the entity responsible for the overall climate policy, is also in charge of monitoring its progress. The evaluation of the overall progress of the IECF is reflected in two documents, which are prepared on a regular basis. The first is the projections report that is submitted to the European Commission every two years and the second is the climate change monitoring report that has to be presented to the cabinet every three years, the first being due in 2011. Also, the Energy Concept 2010 contains provisions for monitoring every three years.

34. As already mentioned in paragraph 27 above, the National Climate Protection Programme, superseded by the IECF, established the guiding principles and framework for Germany to meet its target under the Kyoto Protocol (a 21 per cent reduction in emissions compared with the base year level). In addition, the IECF sets a medium-term emission reduction target of 40 per cent by 2020. In order to achieve this target, the IECF includes pertinent legislation and provides for specific measures aimed at enhancing energy efficiency and intensifying the use of RES.

35. The Energy Concept 2010, which was presented by Germany during the review, extends the country's energy and climate strategy to 2050, maintaining the same medium-term emission reduction target for 2020 as the IECF and defining emission reduction targets of 55 per cent by 2030, 70 per cent by 2040 and 80–95 per cent by 2050 compared with the 1990 level. These targets are planned to be achieved through an ambitious decrease of primary energy consumption (–20 per cent by 2020 and –50 per cent by 2050 compared with the 2008 level), against the backdrop of an expected increase in GDP (7.4 per cent by 2020 and 39.1 per cent by 2050 compared with the 2008 level), and a drastic increase of the share of RES in total final energy consumption (18 per cent by 2020 and 60 per cent by 2050). Germany emphasizes innovative energy technologies, on both the supply and the demand side, as key to achieving these targets. The research and development of these technologies is also the focus of the sixth energy research programme that started in 2011 as an integral part of the Energy Concept.

36. In addition, the Energy Concept identifies nuclear energy as a bridging technology on the road to an age of renewable energy. In June 2011, in the aftermath of the terrible nuclear power accident in Japan, Germany reconsidered the role of nuclear energy and decided to completely phase out electricity production in German nuclear power plants in a step-by-step approach by the end of 2022 at the latest. Germany will therefore develop its Energy Concept further, but the basic strategic approach – the switchover to RES and greater energy efficiency for a secure, environmentally sound and competitive energy supply – still applies and, in particular, the mid- and long-term targets for the reduction of GHG emissions (see para. 35 above) have been confirmed.

37. As a member State of the EU, Germany is obliged to implement EU policy and legislation, including in the areas of energy and environment. In this context, the most prominent is the recent 2008 EU climate and energy package, which sets an emission reduction target for the EU of 20 per cent below the 1990 level by 2020 and also includes targets for the member States' sectors not covered by the EU ETS (non-ETS sector). Under the EU effort-sharing decision (decision 406/2009/EC), Germany has agreed to reduce its emissions from the non-ETS sector by 14 per cent between 2005 and 2020. The EU climate and energy package is linked to: the third trading period of the EU ETS (2013–2020), which establishes a single EU-wide cap on emission allowances for sectors covered by the EU ETS of 21 per cent below the 2005 level in 2020; the EU directive on the promotion of the use of energy from renewable sources (directive 2009/28/EC), which sets for Germany a target of an 18 per cent share of energy from RES in gross final energy consumption by 2020; and the EU-wide reduction of primary energy use by 20 per cent compared with projected levels, which is to be achieved through energy efficiency improvements.

38. In addition, the EU agreed to a 30 per cent emission reduction target by 2020 compared with the 1990 level, provided that other industrialized countries and advanced developing countries commit to comparable reductions. The domestic target set in Germany's IECP (a 40 per cent emission reduction in 2020 compared with the 1990 level) is broadly consistent with this conditional EU target.

39. Approximately 50 per cent of Germany's total GHG emissions are covered by the EU ETS. Germany considers the EU ETS to play an increasingly important role in its overall mitigation efforts and the revision of the EU ETS in its third trading period is estimated to reduce emissions by 15 Mt CO₂ eq annually by 2020.

2. Policies and measures in the energy sector

40. The energy sector accounts for by far the largest share of the total emissions in Germany (79.3 per cent in 2008). Between 1990 and 2008, GHG emissions from the energy sector decreased by 21.4 per cent (212.54 Tg CO₂ eq). This decrease was driven by notable emission decreases in all subsectors, namely energy industries (by 14.8 per cent, or 62.11 Tg CO₂ eq), manufacturing industries and construction (by 35.0 per cent, or 56.28 Tg CO₂ eq), transport (by 6.5 per cent, or 10.67 Tg CO₂ eq), energy use in other sectors (by 30.3 per cent, or 66.70 Tg CO₂ eq) and fugitive emissions (by 57.2 per cent, or 16.78 Tg CO₂ eq). For emissions from fuel combustion, the decrease was achieved through the restructuring of economic activity, especially after the German reunification in 1990, the decarbonization of the economy by fuel switching and the increasing use of zero-emission energy sources and higher energy efficiencies, which together led to a decrease of carbon intensity (GHG emissions per GDP unit) by 41.7 per cent and of energy intensity (total primary energy supply (TPES) per GDP unit) by 29.7 per cent between 1990 and 2008. Meanwhile for fugitive emissions the decrease resulted from the increased recovery of coal mine gas and the modernization of natural gas distribution networks.

41. **Energy supply.** In 2008, TPES was still dominated by fossil fuels, which accounted for 80 per cent of the total. The power generation sector also continues to be dominated by

fossil fuels, and, despite the increase in the share of RES in power generation, fossil fuels continue to be the fuel of choice for electricity generation, accounting for around 60 per cent of the total. Consequently, in 2008 the energy industries sector was still the major source of GHG emissions in Germany (accounting for 357.45 Tg CO₂ eq, or 36.3 per cent of total GHG emissions).

42. Power generation modestly increased between 1990 and 2008, by approximately 10 per cent, following the overall increase in electricity demand. While the amount of nuclear-based power has remained broadly constant and the use of coal-based power has slightly decreased since 1990, the growing demand for electricity has increasingly been met by RES and natural gas. As a result, in 2008 coal accounted for 46 per cent of electricity production, followed by nuclear energy, at 23 per cent, renewable energy, including hydro, geothermal/solar/wind and biomass/waste, at 16 per cent, and natural gas and oil, at 14 per cent and 1 per cent, respectively. The EEG, with its feed-in tariffs, and the Act on the Preservation, Modernization and Development of Combined Heat and Power (CHP) Generation contributed substantially to the promotion of renewables and natural gas for electricity generation.

43. With regard to the energy mix in 2020, during the review Germany presented figures from its Energy Concept 2010 and related scenario. The following is envisaged, according to that scenario, by 2020: a stable share of nuclear energy in the energy mix (recent discussions on the role of nuclear energy in the mid term may affect this – see para. 36 above); an almost doubling of the share of renewable energy; and a considerable decrease in the share of coal, oil and natural gas in TPES. The scenario reflects the expected impact of the energy policy of the Government, which has a strong emphasis on the expansion of renewable energy as well as the decrease of primary energy consumption and electricity consumption (–20 per cent and –10 per cent, respectively, in 2020 compared with in 2008).

44. **Renewable energy sources.** The promotion of RES is one of the cornerstones of Germany's climate policy. This includes the promotion of RES in the power production sector through the EEG, which, according to the NC5, is expected to lead to an emission reduction of 36.3 Mt CO₂ eq by 2020. Additionally, the Act on the Promotion of Renewable Energies in the Heat Sector and the use of biofuels in road transport are expected to reduce emissions by 1.5 Mt CO₂ eq and 10.1 Mt CO₂ eq, respectively, by 2020. During the review, Germany presented its concept on the road to renewables as part of the Energy Concept 2010. This concept sets targets for the share of RES of 35 per cent in electricity production and 18 per cent in total final energy consumption by 2020. The long-term target for 2050 is to reach an 80 per cent share of RES in electricity production and a 60 per cent share of RES in total final energy consumption. During the review, the Party explained that the new electricity targets had been integrated in the EEG, which was amended in July 2011.

45. Germany seeks to achieve the targets referred to in paragraph 44 above through a continuation of the, already in the past successfully implemented, feed-in tariffs for electricity from RES (see para. 28 above) as strengthened by the EEG, and through the implementation of new measures, such as a EUR 5 billion credit programme for offshore wind energy, an expansion of the nationwide electricity grid, a cluster connection of offshore wind farms, an expansion of storage capacities, and the sustainable and efficient use of bioenergy. During the review, Germany explained that the introduction of an optional market premium will be proposed for the amendment of the EEG in 2012. According to the Party, these measures will be facilitated by reliable financing and monitoring, as well as by research and development, particularly in the area of offshore wind energy, the optimization of power supply systems with regard to the expansion of RES, and the development of next-generation RES technologies.

46. In addition to the significant impact on GHG emissions, Germany identifies several positive socio-economic effects as a result of its expansion of RES. These include the creation of new green jobs (206,900 new jobs were created between 2004 and 2010, leading to a total of 360,000 green jobs in 2010), economic growth (in 2010 the investment in plants for the use of RES was approximately EUR 26.6 billion) and increased energy security by reducing the need for imports. Germany is also actively involved in the promotion of RES at the international level, through the International Renewable Energy Agency (IRENA), the International Feed-In Cooperation (IFIC), and RES projects within the framework of the International Climate Initiative.

47. **Energy efficiency.** A second cornerstone of Germany's climate policy is the promotion of energy efficiency, including energy savings. Between 1990 and 2008, energy intensity, expressed as TPES per GDP unit, decreased by 29.7 per cent, from 0.20 to 0.14 toe/USD. The most important measures are the Energy Saving Ordinance and the programmes of the Kreditanstalt für Wiederaufbau (KfW), which aim to promote investments in energy savings and CO₂ reductions. The measures have been revised several times in recent years in order to reflect technological improvements. From 2006 to 2010, loan commitments and investment grants within the framework of the KfW programmes supported energy-efficiency modernizations of 2.4 million residential buildings, with calculated emission reduction effects of 4.7 Mt CO₂. The Energy Saving Ordinance was estimated to be able to reduce emissions by 4 Mt CO₂ eq by 2020. These PaMs show remarkable results; however, according to information provided during the review, there is further potential for energy savings, in particular in existing buildings.

48. The targets for energy efficiency in the Energy Concept 2010 comprise: (a) a reduction of primary energy demand over all sectors by 20 per cent by 2020 and by 50 per cent by 2050 compared with in 2008; (b) an increase in energy productivity by 2.1 per cent per year; and (c) a doubling of the building renovation rate from roughly 1 per cent to 2 per cent per year until 2050. The set of PaMs that is planned to support the achievement of these targets includes: energy efficiency as an important criterion for awarding public contracts; energy consumption labelling; the encouragement of management systems in industry; and the establishment of an Energy Efficiency Fund and the concept for a long-term road map for building renovations. The ERT noted that the effectiveness of the measures and the progress towards the targets will be monitored regularly in the future.

49. **Residential and commercial sectors.** Emissions from the residential and commercial sectors, also known as 'other' sectors, accounted for 15.6 per cent of Germany's total GHG emissions in 2008. The decrease in GHG emissions from energy use in other sectors between 1990 and 2008 (see para. 40 above) contributed significantly to the overall decline in GHG emissions in Germany. In the residential sector, despite a continuous increase in the average size of dwellings, a marked decrease in emissions has been recorded, which was driven mainly by efficiency improvements and better insulation of buildings in Eastern Germany. Households' CO₂ emissions, specifically, decreased from 4.6 t/dwelling in 1990 to 2.7 t/dwelling in 2008. There has also been a decrease in GHG emissions from the military sector, owing to the steep decline in military activity following the German reunification.

50. To address GHG emissions from buildings, Germany combines a regulatory approach with promotion and information. Out of several PaMs, promotion through the KfW support programme for buildings was estimated to achieve the greatest emission reduction effect, of 7 Mt CO₂ eq by 2020. With the existing PaMs, the energy demand of the residential and commercial sectors is estimated to decrease by 7 per cent between 2005 and 2020, with a decreasing share of oil (from 26 to 22 per cent) and an increasing share of RES (from 6 to 8 per cent) and electricity (from 24 to 28 per cent) in the energy mix.

51. **Transport sector.** Emissions from the transport sector accounted for 15.6 per cent of Germany's total GHG emissions in 2008. The trend in transport activity for recent years shows a moderate increase in passenger transport and considerable growth in freight transport. Despite this increase in activity, Germany is one of the few Parties to record decreasing GHG emissions from transport between 1990 and 2008 (see para. 40 above). Within that period, emissions increased up to 1998 and decreased remarkably thereafter. Germany explained that the decrease was driven mainly by rising fuel prices, which are due partly to the ecological tax reform carried out between 1999 and 2003, road pricing for freight trucks, a shift towards international aviation and the increased share of biofuels in transport fuel in recent years. Also, higher fuel prices encouraged people to buy more fuel-efficient cars, including a growing number of diesel cars.

52. However, the ERT noted that higher fuel prices in comparison with many neighbouring countries also led to refuelling outside of Germany and hence to a drop in fuel sales in Germany. The ERT also noted that a further analysis of to what extent these different factors influenced the observed emission trend would be useful, and it encourages the Party to report on such an analysis in its next national communication.

53. The German long-term strategy to reduce GHG emissions from transport involves increased efficiency, an increase in the use of sustainable biofuels (blends), the promotion of electric vehicles and vehicles with fuel cell drive and the promotion of sustainable transport modes. Measures include the European CO₂ standards for new cars, the CO₂-based vehicle tax, the Biofuel Quota Act, the Electromobility Development Plan and the National Hydrogen and Fuel Cell Technology Innovation Programme, the promotion of public transport and the extension of the cycling infrastructure.

54. In its NC5, Germany has included information on its actions addressing GHG emissions from international bunker fuels (aviation and shipping). Germany is continuing its work within the International Civil Aviation Organization and the International Maritime Organization on market-based, technical and operational measures to reduce CO₂ emissions. In addition, during the review Germany explained that aviation will be included in the EU ETS from 2012 onwards, when the EU ETS will be extended to include emissions from all flights departing from or arriving at one of the EU member States, regardless of the origin of the airline operator, and the Party informed the ERT of the introduction of emission-related landing charges in Germany.

55. **Industrial sector.** In 2008, emissions from the industrial sector accounted for 10.4 per cent of Germany's total GHG emissions. The decrease in GHG emissions from manufacturing industries and construction between 1990 and 2008 (see para. 40 above) contributed to the overall decline in GHG emissions in Germany and was due mainly to the restructuring of industry after the German reunification and related efficiency improvements, leading to a strong decline in energy and, in particular, solid fuel use in industry. The main PaMs responsible for efficiency improvements were the KfW programmes for promoting energy efficiency in industry and commerce, trade and services, the Energy Efficiency Fund, which supports advice and consultancy programmes for small and medium-sized businesses, and the innovation and commercialization of energy-efficient products. The direct emission reduction effect by 2020 was estimated to be 0.1 Mt CO₂ eq annually. The ecotax on energy and electricity production (1999) provided tax relief for energy-intensive industry, granted in exchange for voluntary mitigation activities. During the review, the Party informed the ERT that the tax rate was increased and the tax relief for energy-intensive industry reduced in 2010 and that the future of the tax relief beyond 2012 is being discussed.

3. Policies and measures in other sectors

56. Between 1990 and 2008, GHG emissions from industrial processes (including solvent and other product use), agriculture and waste decreased by 21.2 per cent (54.96 Tg CO₂ eq). All non-energy sectors show notably decreasing emission trends between 1990 and 2008, except the LULUCF sector, which turned from a net sink into a net source within the same time period.

57. **Industrial processes.** Between 1990 and 2008, GHG emissions from the industrial processes sector decreased by 9.8 per cent (12.32 Tg CO₂ eq), driven mainly by decreasing production levels, and accounted for 11.2 per cent of Germany's total GHG emissions in 2008. In particular, CO₂ emissions usually follow economic trends and tend to decrease as production decreases, especially in the iron and steel industry, chemical industry and cement industry. To date, a countertrend to increasing production figures has been achieved only in the case of N₂O emissions, which decreased by over 62 per cent between 1990 and 2008 as a result of abatement measures by adipic acid producers starting in 1997 against the backdrop of an increase in production of more than 50 per cent in the same period. The inclusion of N₂O emissions from adipic and nitric acid production in the third phase of the EU ETS is expected to provide incentives for further emission reductions.

58. Although F-gas emissions account for only a small share of Germany's total emissions (1.8 per cent in 2008), they have increased considerably, by 50.5 per cent, since 1990. To address the increase in F-gas emissions, Germany has been implementing EU regulation 842/2006 on certain fluorinated GHGs, together with EU directive 2006/40/EC relating to emissions from air-conditioning systems in motor vehicles. The two policies include leakage control for stationary refrigeration installations, the phase-out of F-gases with high global warming potential (GWP) in air-conditioning systems in new vehicles and certain restrictions on F-gas use.

59. **Agriculture.** Emissions from agriculture accounted for 7.9 per cent of Germany's total emissions in 2008. Between 1990 and 2008, GHG emissions from this sector decreased by 14.1 per cent (12.75 Tg CO₂ eq), driven mainly by reductions in the livestock population and owing partly to reduced fertilizer use. Growing interest in biofuel production in Germany, reflected in the passing of the 2007 Biofuel Quota Act, which mandates fuel sale percentages for biofuels, may have an impact on production and emission levels in the sector. Current policies which are expected to reduce GHG emissions include increasing the use of biogas derived from manure as an energy resource and continuing to expand organic farming. The ERT recommends that Germany, in its next national communication, describe the key PaMs leading to the sectoral emission decrease in the last decade and encourages the Party to include quantifications of the direct effects of its PaMs in the agriculture sector.

60. **LULUCF.** According to the Party's latest inventory submission (2011), the LULUCF sector was a net source of 17.56 Tg CO₂ eq in Germany in 2009 compared with a net sink of 31.17 Tg CO₂ eq in 1990. The inversion of the emission trend was due mainly to the age-class legacy effect and its related increasing fellings and decreasing biomass increment in managed forests, especially at the beginning of this century.

61. Forests cover about 30 per cent of the German territory. Although no forest policies in terms of legislation have been implemented in Germany specifically for climate reasons, sustainable forest management practices have nonetheless resulted in net afforestation rates. The NC5 did not include any information on PaMs in the LULUCF sector, but concise information on mitigation measures in the funding programme of the federal states was provided during the review. Sets of measures were listed for five Länder and Germany explained that non-legislative forest policies related to climate change have been initiated in

nearly all Länder. The ERT recommends that Germany report information on activities in forestry related to climate change in its next national communication.

62. **Waste management.** Between 1990 and 2008, GHG emissions from the waste sector decreased by 69.4 per cent (29.90 Tg), accounting for 1.3 per cent of Germany's total emissions in 2008. The reduction stems from a very successful waste management policy implemented in Germany in the 1990s driven by targets for waste separation, minimization, reuse and recycling, and landfill gas collection and extensive use of waste incineration for power and heat production. Recently, intensified recycling of recyclable materials ('yellow sack', Ordinance on Packaging, etc.) and the ban on landfilling for biodegradable waste, in effect since June 2005, have significantly reduced the annual quantities of landfilled waste. Together with mandatory landfill gas recovery, the measures have reduced emissions from landfills by 74.4 per cent since 1990. Since 1 June 2005, all municipal waste that is not recycled or recovered must be incinerated or treated by mechanical biological methods before entering a landfill. As a result, CH₄ emissions from landfills will result solely from waste deposited prior to that date. In order to achieve the desired emission reduction, approximately 20 mechanical biological treatment facilities and six incinerators were constructed between 2001 and 2005. Germany is moving towards the complete elimination of landfills for household waste by 2020.

63. The ERT acknowledges that life cycle analysis quantifications for PaMs were presented during the review. This analysis shows clearly that a significant amount of emission reductions due to waste management are reflected also in sectors other than the waste sector. The ERT reiterates the encouragement given in the previous review report that Germany nevertheless include quantifications of the direct effects of its PaMs in the waste sector in its next national communication. Further, the ERT recommends that all key PaMs leading to the sharp decrease in emissions from the waste sector in the last decade should be described in chapter 4 of the Party's next national communication.

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

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

65. Germany reported that most of its PaMs are not expected to have direct effects on developing countries and that, for those PaMs that do have a direct or indirect effect, the effects are largely considered to be positive. Such effects would include, for example, the establishment of technical and administrative structures for climate protection, and beneficial impacts on energy supply and prices in cooperating countries. The only possible negative effect identified would occur via the promotion of non sustainably produced biofuels. Such promotion could lead to the destruction of or adverse shifts in resources in developing countries. To ensure that biofuels imported from such countries are produced in keeping with the principals of sustainable development, the Federal Government is working, within the framework of various initiatives, to develop internationally applicable sustainability standards in conformance with the World Trade Organization and pertinent certification systems.

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

66. In its NC5, Germany has provided comprehensive information on its GHG emission projections, including a ‘with measures’ scenario up to 2020. During the review, Germany provided further information on an updated energy scenario that was the basis for the Energy Concept 2010.

1. Projections overview, methodology and key assumptions

67. The GHG emission projections provided by Germany in the NC5 include a ‘with measures’ scenario until 2020, presented relative to actual inventory data for 2005. Projections are presented on a sectoral basis, using the same sectoral categories as in the PaMs section of the NC5, and on a gas-by-gas basis for all GHGs: CO₂, CH₄, N₂O, perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (treating PFCs and HFCs collectively in each case). Projections are also provided in an aggregated format for each sector as well as for the national total, using GWP values. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and not included in the totals.

68. However, the ERT noted that detailed information on projections by sector and by gas, additional information on projection parameters and the estimated total effect of adopted and implemented PaMs were not reported explicitly in the NC5, but were provided in an Excel file submitted together with the NC5. To enhance transparency, the ERT recommends that Germany provide all mandatory reporting elements in its next national communication and include references if more detailed additional information is given elsewhere. The ERT also noted that Germany did not provide a comparison of the assumptions and methods employed for the NC5 with those used for the NC4, a summary of the strengths and weaknesses of the approach used and information on how that approach accounts for synergies and overlap between different PaMs. Most of this information was provided during the review and the ERT encourages the Party to include it in its next national communication.

69. As required by the UNFCCC reporting guidelines, the ‘with measures’ scenario reported in the NC5 encompasses the effect of all implemented and adopted PaMs until 2008 as contained in the IEC. The ERT noted that ‘without measures’ scenarios were prepared at the sectoral level, but not for the national total. The ERT considers that a complete ‘without measures’ scenario would facilitate the quantification of the total effect of the Party’s PaMs (see para. 82 below) and therefore encourages Germany to provide such a scenario in its next national communication.

70. The ERT noted that a ‘with additional measures’ scenario was prepared but not reported in the NC5. During the review, Germany explained that this scenario included suggestions for additional PaMs that would be necessary for compliance with its domestic 2020 emission reduction target, but that it did not include government agreement on the long-term strategy that such PaMs would involve. Germany also explained that after the submission of its NC5 an agreement on a long-term strategy was reached, and that this resulted in the Energy Concept 2010. Additional measures have already been launched. The ERT appreciates the elaborate and comprehensive efforts made by the Party and encourages Germany to consider the inclusion of a ‘with additional measures’ scenario, if applicable, in its next national communication.

71. The ‘with measures’ scenario reported in the NC5 is based on a study entitled “Policy Scenarios V”, which was carried out by a consortium of German research institutes by order and account of the Federal Environment Agency and BMU. For the various

sectors involved, different bottom-up models and approaches were used, including optimization and demand-supply models. This is in contrast to the methodology employed for the NC4, for which a macroeconomic top-down model was used for all sectors. According to the Party, the approach employed for the NC5 is a policy-oriented modelling approach and allows for the analysis and assessment of the implications of various PaMs for emission levels; for example, it is possible to assess the implications of combined heat and power production, nuclear power and the composition of electricity supply with a high share of wind and solar energy, determination of activities by category and determination of projection parameters. The structure of the projected activities is consistent with the structure of the GHG inventory, which facilitates the subsequent preparation of GHG emission projections using a model that is consistent with that used for preparing the inventory estimates.

72. The NC5 includes quantitative information on key underlying assumptions and variables for 2010, 2015 and 2020, including economic growth and structure, energy prices and exchange rate, price of emission allowances, population and number of households. Information on relevant factors and activities in each sector is also provided. The main assumptions include (real) GDP growth of 1.6 per cent annually, a slight decrease in the population, by 1 per cent, between 2005 and 2020, an oil price of USD 60/barrel in 2020, and a CO₂ price of EUR 20 in 2010 and EUR 30 in 2020.

73. These assumptions were made before the financial and economic crisis and thus do not account for its effects, but such effects are considered in the more recently prepared energy scenario within the Energy Concept 2010. The ERT noted that assumptions on future European and international energy markets, and thus an overview of future available energy sources, were not included in the NC5. It encourages Germany to include relevant information in its next national communication.

74. The NC5 provides results of sensitivity analyses for individual sectors, such as the transport and building sectors, as well as for total energy-related GHG emissions. The sensitivity of the projections to the following underlying assumptions was presented: economic growth, energy prices, population growth and modernization rate of buildings. The main results of the sensitivity analysis are: higher energy prices may provide incentives for further emission reductions in the industrial sector; and relatively small changes in economic growth may significantly affect Germany's total energy-related GHG emissions. Given the significant impact of the financial and economic crisis on GHG emissions (see para. 16 above), the ERT encourages Germany to continue its consideration of economic sensitivities. An important element of such analysis may be the availability of new energy supplies within Europe and internationally.

2. Results of projections

75. Table 4 and the figure below show that Germany expects to meet its Kyoto Protocol target by domestic efforts with adopted and implemented PaMs. The 'with measures' scenario uses 2005 as the starting point for the projections, when emissions were 18.4 per cent below the Kyoto Protocol base year level. In this scenario, emissions were expected to decrease further and reach 23.3 per cent below the base year level in 2010.

76. Concerning 2020, in the 'with measures' scenario, Germany expects to further decrease its emissions by 2020, to 32.1 per cent below the 1990 level or 15.5 per cent below the 2005 level. The Party identified that the effect of implemented PaMs is not sufficient to comply with its domestic 2020 emission target (40 per cent below the 1990 level) and that additional measures are necessary. The ERT noted that Germany's emission target for the non-ETS sector under the EU effort-sharing decision (14 per cent below the 2005 level) will also not be met by implemented measures alone. To that end, information provided by Germany during the review shows that, in the 'with measures' scenario,

emissions from the non-ETS sector are expected to be 11.6 per cent below the 2005 level in 2020.

77. With regard to the emission projections by gas, the trend in the Party's total emissions is mainly influenced by the trend in its CO₂ emissions, with CO₂ expected to remain the main gas, accounting for nearly 90 per cent of the total emissions. In relative terms, CH₄ emissions are expected to decrease the most by 2010, by 62 per cent, and by 2020, by 71 per cent, compared with the 1990 level. N₂O and CO₂ emissions are also expected to decrease: N₂O by 35 per cent by 2010 and by 45 per cent by 2020, and CO₂ by 20 per cent by 2010 and by 28 per cent by 2020. Of all the gases, only F-gas emissions are expected to increase. However, according to the projections, they will peak in 2010, at 27 per cent above the 1990 level, and decrease thereafter, reaching 18 per cent above the 1990 level in 2020.

78. The Energy Concept 2010 that was presented during the review (see para. 35 above) translates the Party's long-term energy strategy into those additional measures that are necessary for Germany to comply with its GHG emission reduction targets for the mid term (–40 per cent by 2020) and the long term (–80 to –95 per cent by 2050). The scenario created for the Energy Concept 2010 is based on parameters reflecting recent economic development (i.e. they assume more moderate GDP growth than the 'with measures' scenario), on significant energy efficiency improvements and on a significant increase of the share of RES in the energy mix. The scenario shows that a reduction of 44.2 per cent in energy-related emissions compared with the 1990 level is technically and economically feasible.

Table 4
Summary of greenhouse gas emission projections for Germany

	<i>Greenhouse gas emissions (Tg CO₂ eq per year)</i>	<i>Changes in relation to base year level (%)</i>	<i>Changes in relation to 1990 level (%)</i>
Inventory data 1990 ^a	1 251.2	–	–
Inventory data 2008 ^a	983.7	–20.2	–21.4
Kyoto Protocol base year ^b	1 232.4	0.0	–1.5
Kyoto Protocol target ^b	973.6	–21.0	–22.2
'With measures' projections for 2010 ^c	944.7	–23.3	–24.5
'With measures' projections for 2020 ^c	849.6	–31.1	–32.1

^a *Data source:* Germany's 2010 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry.

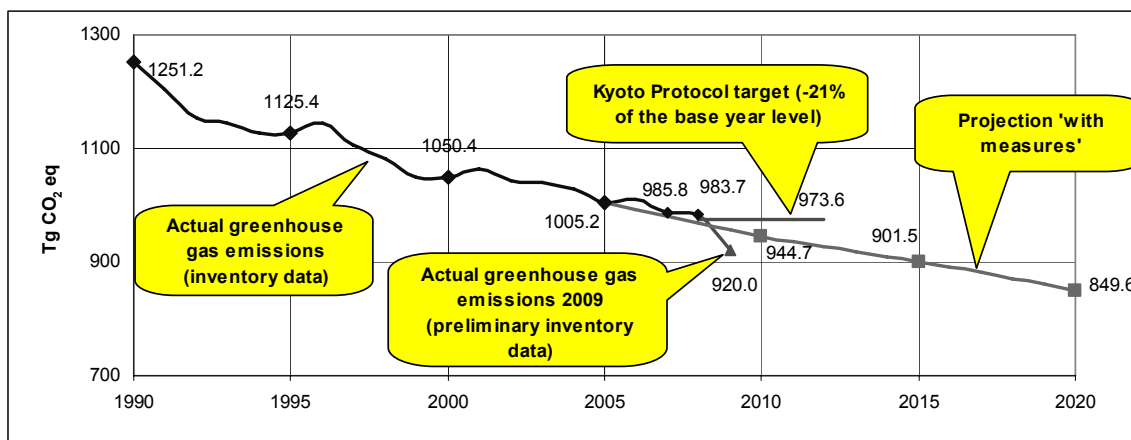
^b *Data source:* Based on the initial report review contained in document FCCC/IRR/2007/DEU.

^c *Data source:* Germany's fifth national communication.

79. The ERT noted that some underlying assumptions for the Energy Concept 2010 regarding energy market and technology development will depend not only on the progress in German energy and climate policy, but also on the combined efforts of several developed countries. These include carbon dioxide capture and storage (CCS), which is assumed to be market-ready by 2025; the extension of the energy grid to achieve an integrated European electricity market by 2050, enabling cost-effective emission reductions through net imports of 22–31 per cent of the total electricity demand in Germany; and similar efforts regarding the promotion of RES in other countries. Other challenges for Germany in meeting its long-term emission reduction target might include the extension of the electricity grid to

integrate electricity generated from RES in Germany and the successful promotion of offshore wind energy.

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2008: Germany’s 2010 greenhouse gas inventory submission; (2) Data for 2009: preliminary data presented by Germany during the review; (3) Data for the years 2010–2020: Germany’s fifth national communication. The emissions are without land use, land-use change and forestry.

3. Total effect of policies and measures

80. Germany presented the estimated and expected total effect of its implemented and adopted PaMs in an Excel file that was submitted together with its NC5. Information is presented in terms of GHG emissions avoided or sequestered, by sector (on a CO₂ eq basis), in 2010, 2015 and 2020. The ERT considers that this information could easily be reported in a table integrated in the national communication and recommends that Germany include such a table in its next national communication.

81. Germany calculated the total effect of its implemented PaMs by adding up the individually assessed effects of individual PaMs. Most of these effects were calculated by taking the difference between the sectoral ‘with measures’ and ‘without measures’ scenarios. Overlaps of effects of PaMs were considered directly in the sectoral models and identified overlaps between the sectors were considered on the basis of expert judgement. The ERT commends Germany for these efforts.

82. The ERT noted that the effects of the Party’s PaMs are quantified for the energy sector only, and that the total effect does not include the effects of successfully implemented PaMs in other sectors (e.g. in the waste sector). As a result, the reported total effect of the Party’s PaMs might have been underestimated. If this proves to be the case, Germany might want to consider employing a more integrated approach, involving preparing a ‘without measures’ scenario for the total GHG emissions and then calculating the total effect of its PaMs as the difference between the ‘with measures’ and the ‘without measures’ scenarios.

83. Germany reported that the estimated total effect of its adopted and implemented PaMs is an emission reduction of 20.0 Tg CO₂ eq in 2010, or less than 2 per cent of the GHG emissions in 1990. According to the information reported, PaMs implemented in the energy supply sector will deliver the largest emission reductions (7.1 Tg CO₂ eq), followed by PaMs implemented in the transport (6.3 Tg CO₂ eq) and other energy sectors, including residential and commercial (5.8 Tg CO₂ eq).

84. The total effect of Germany's PaMs in 2020 is estimated to be an emission reduction of 103.5 Tg CO₂ eq, or 8.3 per cent of the GHG emissions in 1990. The greatest effect of implemented measures is identified in the energy supply sector (61.2 Tg CO₂ eq), while measures targeting transport will contribute an emission reduction of 21.1 Tg CO₂ eq. Table 5 provides an overview of the total effect of PaMs as reported by Germany.

85. According to the information reported in the NC5, between 1990 and 2010 emissions are expected to decrease most in the energy supply sector (by 83 Tg CO₂ eq, or 20 per cent), followed by manufacturing industries and construction (by 59 Tg CO₂ eq, or 37 per cent) and other energy consumption (by 55 Tg CO₂ eq, or 25 per cent). The most sizeable emission reductions in relative terms are expected to occur in the waste sector (by 33 Tg CO₂ eq, or 77 per cent). Further emission decreases are expected up to 2020: by 85 per cent in the waste sector, 78 per cent for fugitive emissions and 36 per cent in the agriculture sector, compared with the 1990 levels. Expected emission reductions in the transport sector are more modest, with a 2 per cent reduction by 2010 and a 10 per cent reduction by 2020 compared with the 1990 level. The most effective PaMs and drivers behind GHG emission reductions are described in chapters II.B.1 and II.B.2 above.

Table 5
Projected effects of implemented and adopted policies and measures in 2010 and 2020

Sector	2010		2020	
	Effect of implemented and adopted measures (Tg CO ₂ eq)	Relative value (% of 1990 emissions)	Effect of implemented and adopted measures (Tg CO ₂ eq)	Relative value (% of 1990 emissions)
Energy (without transport)	13.3	1.6	82.4	10.0
Transport	6.7	4.1	21.1	12.8
Industrial processes	NA	NA	NA	NA
Agriculture	NA	NA	NA	NA
Land-use change and forestry	NA	NA	NA	NA
Waste management	NA	NA	NA	NA
Total	20.0	1.6	103.5	8.3

Source: Germany's fifth national communication (NC5) (additional Excel file submitted).

Note: The total effect of implemented and adopted policies and measures (PaMs) is defined as the sum of the effects of individual PaMs, although this was not reported in the Party's NC5.

Abbreviation: NA = not available.

4. **Supplementarity relating to mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol**

86. Germany, in its NC5, provided explicit information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. Germany does not intend to make use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol. According to the projections provided in the NC5, Germany expects its GHG emissions to be 23.3 per cent below the base year level in 2010, or 2.3 percentage points below its Kyoto Protocol target (21 per cent below the base year level). The latest inventory data for 2008 and preliminary data for 2009 show that in 2008 and 2009 emissions were 20.2 and 25.4 per cent below the base year level, respectively. According to German authorities, Germany does not expect that its accounting for activities

under Article 3, paragraphs 3 and 4, of the Kyoto Protocol will deliver removal units during the first commitment period of the Kyoto Protocol.

87. In accordance with the EU linking directive,⁴ companies in the EU ETS can meet their emission reduction targets by reducing emissions and/or by acquiring emission allowances from the market. Companies in Germany can use up to 22 per cent of their emission certificates from clean development mechanism (CDM) and joint implementation (JI) projects. In addition, the JI/CDM activities of BMU support intergovernmental initiatives as a framework for entrepreneurial initiatives.

D. Vulnerability assessment, climate change impacts and adaptation measures

88. In its NC5, Germany has provided the required information on the expected impacts of climate change in the country and on adaptation options. Germany included an analysis of possible impacts of climate change, but there was limited assessment of the country's vulnerability to such impacts. However, during the review, the Party presented further information on its activities regarding vulnerability assessment. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC5.

89. Similar to in its NC4, Germany identified, in its NC5, human health, water resources, soils, biological diversity, agriculture and forestry, transport and tourism as areas vulnerable to climate change. Research on the impacts of climate change is being carried out within the framework of the German Climate Research Programme through several projects and studies, including preventive risk and coastal protection management at the North Sea, and the use and management of water resources at the regional level. In addition, Germany reported some adaptation options for each of the vulnerable sectors. However, no specific evaluation of adaptation options was carried out.

90. To facilitate its efforts to address adverse impacts of climate change and consequent adverse effects on society, the economy and the environment, Germany developed the German Strategy for Adaptation to Climate Change in 2008. The strategy serves as a framework for assessing the climate change risks, identifying the possible relevant requirements for action, defining relevant objectives and developing and implementing adaptation measures in the key vulnerable sectors. While this is quite advanced in terms of putting climate change into a policy and planning context, methodologies or approaches (either nationally derived or internationally agreed) used to develop the Strategy for Adaptation to Climate Change and for impact analysis in the various sectors were not reported. The ERT therefore encourages Germany to further elaborate on its methodologies or approaches used for impact assessment, vulnerability and adaptation in its next national communication.

91. The ERT noted that Germany has identified key adaptation options, strategies and measures for each key vulnerable sector in its Strategy for Adaptation to Climate Change. During the review, Germany explained that it is developing the 2011 Action Plan to describe upcoming national and international activities, to further improve the knowledge base and climate services, to raise public awareness, to enhance a broad dialogue and communication process, to foster participation and stimulate individual contributions, to support stakeholders by providing a solid information base for decision-making, and to

⁴ 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.

procure decision support (including uncertainty appraisal). These overarching activities will provide the framework for both sectoral and regional adaptation measures.

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

<i>Vulnerable area</i>	<i>Examples/comments/adaptation measures reported</i>
Agriculture and food security	<p><i>Vulnerability:</i> Stress from heat, cold, drought, wetness, heavy rainfall, soil erosion, wind and storms is expected to increase the risk of significant harvest failures</p> <p><i>Adaptation:</i> The need for promotion of innovation in the areas of plant breeding, nutrient balance in crops, resistance properties and quality characteristics, as well as the need for increasing yield capabilities and enhancing genetic diversity to expand crop rotation have been identified</p>
Biodiversity and natural ecosystems	<p><i>Vulnerability:</i> According to estimates, climate change could cause up to 30 per cent of flora and fauna species to become extinct as a result of their limited adaptability in the coming decades; especially mountain and coastal species, as well as species specifically adapted to water bodies, wetlands or small special habitats, are endangered</p> <p><i>Adaptation:</i> Biotope networks and renaturation projects are planned to safeguard or even restore natural systems' ability to adapt. Also, many efforts to reduce pollutant and nutrient discharges into ecosystems, to protect habitats and biological diversity, are under way</p>
Forests	<p><i>Vulnerability:</i> Increasing summer temperatures and longer dry periods will lead to heat and drought stress and increase the risk of forest fires. Increased stress will exacerbate the risk of losses via pests, such as bark beetles. Large swarms of certain pests, such as the nun moth or the cockchafer, could occur more frequently; and previously insignificant or ignored pests could multiply</p> <p><i>Adaptation:</i> The need to convert forests from single-species stands to locally adapted mixed stands that face smaller risks and the need to refine environmental monitoring with respect to forest health have been identified</p>
Human health	<p><i>Vulnerability:</i> A milder climate and extreme weather events are expected to increase the risk of transmittable (endemic and non-endemic pathogens in Germany) and non-transmittable (e.g. cardiovascular) diseases</p> <p><i>Adaptation:</i> Among other activities, a heatwave warning system is being carried out and improved data analysis for risk assessment and the development of suitable prevention and intervention strategies is planned</p>
Infrastructure and transport	<p><i>Vulnerability:</i> Extreme weather conditions like snowstorms, icestorms, dense fog, hailstorms, heatwaves, storms, torrential rainfall and flooding are expected to increase the risk of damaged roads and railway lines and can also directly hinder transport</p> <p><i>Adaptation:</i> A review is planned to assess whether the highway infrastructure needs to be adapted by modified construction materials and improved drainage infrastructure</p>
Soils	<p><i>Vulnerability:</i> Climate and usage changes are expected to affect nutrient and water cycles and soil-formation processes (humus formation/carbon binding, groundwater formation, soil degradation via erosion, and nutrient cycles/growth conditions)</p> <p><i>Adaptation:</i> The need for locally adapted land-use strategies has been identified. Discussion is under way regarding ways of optimizing and possibly expanding existing soil monitoring programmes</p>
Water resources	<p><i>Vulnerability:</i> More frequent occurrence of extreme events, such as strong rainfall, storm surges and droughts, as well as diminishing of snowpacks and increasing water temperature of aquatic systems are expected to increase the risks of summer and winter floods, ecological health disturbances, erosion and lower oxygen concentration in water bodies</p> <p><i>Adaptation:</i> Six-year risk analysis, danger/risk maps and flood risk management plans are regularly updated</p>

92. The ERT also noted that little or no quantitative assessment or evaluation of the cost of adaptation options, strategies and measures was done. While the vulnerability and adaptation assessment covered all the key sectors, most of the impacts and adaptation options are based on the qualitative assessment of the biophysical and/or human effects. The ERT considers that further elaboration of the identified impacts and vulnerabilities will be important for generating evidence-based information to inform decisions on adaptation policy in the future and encourages Germany to provide such elaboration.

93. In its NC5, Germany did not include specific information on its cooperation with developing countries in preparing for adaptation in accordance with Article 4, paragraph 1(e), of the Convention. During the review, the Party informed the ERT about various programmes that are being carried out with developing countries, such as the capacity-building programmes of the Deutsche Gesellschaft für Internationale Zusammenarbeit. The ERT recommends that Germany report more explicitly and concisely on these activities as they meet the special needs of the countries listed in Article 4, paragraphs 4, 8 and 9, of the Convention. Programmes and projects that are being implemented in arid and semi-arid regions and those in vulnerable coastal regions can be included.

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

94. The information provided in the NC5 covers most of the issues on which information is required under the Convention and its Kyoto Protocol. However, the ERT noted that the Party did not provide the following reporting element required by the UNFCCC reporting guidelines: a clarification of how it has determined financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention as being “new and additional”. The ERT recommends that Germany enhance the completeness of its reporting by including this information (e.g. substantiated by further information on climate change related official development assistance (ODA)) in its next national communication. To enhance transparency, the ERT also recommends that Germany follow more closely the structure outline contained in the annex to the UNFCCC reporting guidelines when reporting on financial resources and transfer of technology, and encourages the Party to include further information on its funds provided through multilateral channels, as well as further information on technology transfer, capacity-building and private-sector activities, in its next national communication.

95. In its NC5, Germany has provided details on measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention as required by the UNFCCC reporting guidelines and under Article 11 of the Kyoto Protocol as required by the “Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Germany has indicated what “new and additional” financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention and, during the review, it clarified how it has determined such resources as being “new and additional”. Germany noted that at the time of preparing the NC5 there was no internationally agreed definition of “new and additional” financial resources. Therefore, Germany refrained from giving a definition of “new and additional” in the NC5, but stated that the sharp increase of financial support provided between 2004 and 2008 reflected the provision of “new and additional” funding. The ERT recommends that Germany provide further information on climate change related ODA in its next national communication in order to substantiate the “new and additional” financial resources it has provided. Germany expressed its intention to

provide more up-to-date data on its climate-related ODA and on the Rio markers for adaptation and mitigation in its next national communication.

96. Germany has also provided detailed information on the assistance it has made available to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them meet the costs of adaptation to those adverse effects. Furthermore, Germany has provided information on other financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels, including the Global Environment Facility (GEF). Table 7 summarizes the information reported on financial resources.

97. Germany plays a considerable role in assisting developing countries and countries with economies in transition by providing financial aid through its well-developed multilateral and bilateral development assistance. Much of the bilateral support has been part of its ODA support to developing countries. While the majority of Germany's contribution to bilateral and multilateral funding is for mitigation or GHG reduction programmes and technologies, some bilateral funding has been provided for adaptation projects and programmes in developing countries. Support is provided for the areas of energy, transport, forest conservation, agriculture, water resources management, planning and development and adaptation to climate change.

Table 7
Summary of information on financial resources for 2004–2008

<i>Channel of financial resources^a</i>	<i>Years of disbursement</i>				
	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>
Climate-related aid in bilateral ODA for mitigation (USD million) ^b	285.5	462.8	672.9	453.1	1 412.2
Climate-related aid in bilateral ODA for adaptation (USD million) ^c	295.9	263.9	352.3	273.1	794.4
Contributions to the GEF (USD million) ^d	73.0	73.0	73.0	74.0	74.0
LDCF (EUR million)	15.0 ^e	-	-	25.0	-
SCCF (EUR million)	5.0	-	-	5.0	10.0

Abbreviations: GEF = Global Environment Facility, LDCF = Least Developed Countries Fund, ODA = official development assistance, SCCF = Special Climate Change Fund.

^a All values in current USD or EUR. Commitments include gross ODA value of grants and loans.

^b Data based on Rio marker for climate change.

^c Data based on bilateral ODA in water and sanitation sectors.

^d Contributions to GEF Trust Fund follow a four-year replenishment cycle – they have been divided by four to include annual figures in the table.

^e Data are for 2003.

98. Germany also contributes to the multilateral funds for climate change. This includes its contributions to the GEF. After stable contributions to the third replenishment of the GEF (2002–2006) and to the fourth replenishment of the GEF (GEF 4) (2006–2010) of USD 294 million and of USD 295 million, respectively, Germany committed EUR 347 million for the fifth replenishment of the GEF (GEF 5) (2010–2014), which corresponds to 13.5 per cent of new donor funding and an increase of 62 per cent compared with its contribution to GEF 4. With this commitment, Germany remains the third largest

contributor to the GEF. In total, 32 per cent of GEF 5 resources are allocated to the climate change focal area. Additionally, Germany contributes to the Least Developed Countries Fund (LDCF) (up to EUR 115 million until 2011) and the Special Climate Change Fund (SCCF) (up to EUR 60 million until 2011), which makes Germany the largest donor to the LDCF and SCCF.

99. As regards its most recent financial contributions to enhance the implementation of the Convention by developing countries (fast-start financing for the period 2010–2012), Germany pledged EUR 1.26 billion with a balanced allocation between mitigation, adaptation and REDD-plus,⁵ but with at least one third for adaptation and EUR 350 million for REDD-plus. According to the Party, these funds are additional to the level of climate-related support already provided in 2009 or are based on innovative sources, such as proceeds from the sale of emission allowances under the EU ETS. EUR 361.5 million of the total pledge was allocated in 2010, with EUR 217.4 million for mitigation, EUR 75.7 million for adaptation and EUR 68.4 million for REDD-plus. During the review, Germany provided information on its financial contribution to the Adaptation Fund, established in accordance with decision 10/CP.7, of EUR 10 million in 2010 as part of its fast-start financing; and information on the provision of a grant of EUR 40 million to the Forest Carbon Partnership Facility and of grants and loans to the Climate Investment Funds: a concessional loan of EUR 500 million to the Clean Technology Fund and a grant of EUR 50 million to the Pilot Program for Climate Resilience.

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

100. In its NC5, Germany has provided details of measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies, and has clearly distinguished between activities undertaken by the public sector and those undertaken by the private sector. In addition, it has reported on its activities related to technology transfer, including success stories, using table 6 of the UNFCCC reporting guidelines, and on its activities for financing access by developing countries to ‘hard’ or ‘soft’ environmentally sound technologies. Furthermore, Germany has reported in textual format on steps taken by governments to promote, facilitate and finance the transfer of technology and to support the development and enhancement of endogenous capacities and technologies of developing countries.

101. However, the information provided was not well structured and was difficult to identify in the NC5, not least because no separate subsection on activities related to technology transfer was included. Furthermore, it was not clear whether the project examples involve technology transfer and/or capacity-building. During the review, Germany explained that technology transfer and capacity-building activities are mostly integrated with mitigation and adaptation projects and that it considers capacity-building as well as technology transfer as an integral part of international cooperation. To improve transparency, the ERT recommends that Germany structure this information in a separate subsection so that information on technology transfer and capacity-building activities is easily identifiable. The ERT also recommends that the Party report on activities undertaken by the private sector, if relevant information is available, in its next national communication.

102. The Government of Germany supports financing and transfer of technical equipment, know-how and experience for the purposes of mitigation and adaptation.

⁵ Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

Germany provides support through a programme of financial cooperation by availing grants, low-interest loans and low-cost development loans for investments in partner countries. In 2007, approximately 40 per cent of funds allocated for financial cooperation were invested in mitigation and adaptation projects in developing countries. During the 2008–2009 period, an amount of EUR 120 million was raised from the sale of emission allowances under the EU ETS, most of which was earmarked under the International Climate Initiative to support bilateral projects in developing countries.

103. In addition to financing projects with ODA funding, the Federal Government also supports private-sector investments in climate protection in developing countries, by making long-term capital available to private companies. During the review, Germany explained that by the end of 2009 the Global Climate Partnership Fund had been created, a fund that combines public and private capital, for mobilizing private capital for investment in climate change mitigation in developing and emerging countries. The fund operates on a revolving basis and does not consume capital. The public capital acts as a risk buffer for mobilizing additional capital and thus creates incentives for private investors by this hedging of risk.

F. Research and systematic observation

104. Germany has provided information on its numerous actions relating to research and systematic observation, and has addressed both domestic and international activities, including the World Climate Research Programme, the International Geosphere–Biosphere Programme, the World Weather Watch Programme, the Global Atmosphere Watch, the Global Ocean Observing System (GOOS), the Global Climate Observing System (GCOS), the Global Terrestrial Observing System and the Intergovernmental Panel on Climate Change (IPCC). In addition, the NC5 reflects action taken to support related capacity-building in developing countries. Furthermore, Germany has provided a summary of information on GCOS activities.

105. Numerous institutions in Germany are involved in and are making significant contributions to research covering the various aspects of the climate system within the framework of the government initiatives on research and technology development. Germany emphasizes the continuous, long-term observation of processes in the atmosphere, in the ocean and on land. In addition, it relies on work being carried out by: the new research aircraft HALO and POLAR 5; the new Antarctic station Neumayer III; and the new research ship Maria S. Merian. Satellite monitoring involves polar ice caps, major continental glaciers, deserts, rain forests and oceans. The German High Performance Computing Centre for Climate and Earth System Research contributed to the development of the ECHAM model, a global circulation model used for the projection of temperature and precipitation under the various GHG scenarios, which has been used in the status analyses of the IPCC. Since the 1990s, regional and local climate modelling has also been an established part of German research.

106. Research on climate change is embedded in the Federal Ministry of Education and Research's framework programme on research for sustainability. Research activities cover physical science, climate impacts and adaptation, energy and mitigation, and options for the economy and society. In Germany, research and innovation is also a central priority of its energy policy, with a focus on energy efficiency, renewable energies including offshore wind and biomass, basic energy research including CCS, and energy and resource efficiency in the construction sector. With the development of and its participation in the dialogue for sustainability, Germany supports the research and development cooperation and scientific-technological cooperation in sustainability-relevant areas with developing countries. The ERT encourages Germany to elaborate on ways of increasing its

international cooperation on research and systematic observation, especially in supporting related capacity-building activities in developing countries.

107. In terms of international cooperation on systematic observation, a national GCOS coordinator within the German Meteorological Services (DWD) serves as a liaison between the relevant national institutions and organizations and the global GCOS programme. Observation of the atmospheric essential climate variables is carried out primarily by DWD, but the Alfred Wegener Institute for Polar and Marine Research (AWI) and the Länder also carry out relevant activities. Since early 2008, AWI has also been responsible for the operation of the World Radiation Monitoring Center. The Federal Maritime and Hydrographic Agency (BSH) coordinates the German contributions to GOOS. DWD is also responsible for satellite-based climate monitoring outside of Europe, and is the largest partner in the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), which is responsible for planning and operating meteorological satellite series in Europe. In addition, DWD and AWI contribute to the GCOS Surface Network and the GCOS Upper-air Network.

G. Education, training and public awareness

108. In its NC5, Germany has provided substantial information on its domestic and international actions related to education, training and public awareness. Authorities at the federal, regional (Länder) and local (municipalities) levels administrate domestic actions, and extensive activities are maintained by non-governmental organizations (NGOs), educational institutions, etc. To a large extent, Germany's international actions involve the cross-cutting parts of cooperative projects and capacity-building activities. Also, Germany funds the training of experts from developing countries (e.g. at the Renewables Academy).

109. In Germany, education on climate change is integrated in the concept of education for sustainable development that has been developed since the 1990s. In this context, a range of activities has been initiated in schools, training programmes and vocational training. The development of school and professional curricula is the responsibility of the Länder and thus not harmonized at the federal level. Complementary to the activities at the regional level, the Federal Government, through the BMU education service, provides financial and structural support for climate change education in schools through the National Climate Initiative. One innovative activity within this initiative is the distribution of a 'climate box' that contains energy-measuring devices, a climate change science kit and teaching materials. The 'climate box' is very popular and had been provided to 1,740 schools as at February 2011. During the review, Germany provided information on the development of vocational skills focusing on practical applications in mitigation and adaptation projects. The ERT encourages the Party to consider how climate-related skills could be focused more specifically in vocational training and how employment and capacity-building aspects could be taken into consideration.

110. Since 2006, BMU has conducted several advertising campaigns and issued publications related to climate protection issues. Its activities include providing information on websites and in newsletters, thematic publications and pamphlets, awareness-raising in schools, and campaigns to raise awareness of climate change issues as well as general environmental topics that also cover climate change. Information campaigns are also linked to subsidy programmes (e.g. for the installation of RES systems in households). Environmental and business NGOs play an important role, both by providing additional information materials to the public and by conducting professional training activities. Over the last 20 years, Germany has been monitoring the attitude to, and awareness of, climate-related issues through regular national surveys on environmental awareness. The German

population is well aware of climate change and its impact and is generally supportive of climate change policies.

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

111. Germany has provided most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC5. The supplementary information is placed in different chapters of the NC5. Table 8 provides an overview of the supplementary information provided by Germany under Article 7, paragraph 2, of the Kyoto Protocol, as well as references to the chapters of the NC5 in which this information is provided.

112. Germany has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: a description of the national registry, and a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources. During the review, Germany provided the missing information. The ERT recommends that Germany include those reporting elements in its next national communication. The technical assessment of the information reported under Article 7, paragraph 2, is contained in the relevant sections of this report.

Table 8

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

<i>Supplementary information</i>	<i>Reference in NC5</i>
National registry	Chapter 3.9
National system	Chapter 3.8
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Chapter 4.4
Policies and measures in accordance with Article 2	Chapter 4.8.2
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Chapters 4.1–4.3
Information under Article 10	Chapters 4, 6, 7, 8 and 9
Financial resources	Chapter 7

Abbreviation: NC5 = Germany's fifth national communication.

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

113. Germany reported the information requested in section H. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the annex to decision 15/CMP.1 as a part of its 2010 annual submission. It has not reported, however, how it gives priority to the actions taken in implementing its commitments under Article 3, paragraph 14. During the review, Germany provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the

Convention. The ERT considers the reported information, although limited, to be transparent and complete. The ERT commends Germany for the additional information provided and encourages it to continue exploring and reporting on the minimization of adverse impacts, including by indicating how it gives priority to the actions taken in implementing its commitments under Article 3, paragraph 14.

114. The Party's 2010 NIR and additional information provided during the review explain that most of the measures carried out in Germany are not expected to have adverse impacts on developing countries. The promotion of biofuels was the only policy that Germany highlighted as having the potential to cause negative indirect effects on developing countries (see para. 65 above). During the review, Germany presented several initiatives of Germany aiming to minimize adverse impacts by assisting developing country Parties which are highly dependent on the export of fossil fuels in diversifying their economies. Activities include its participation in: the renewable energy cooperation with the Mediterranean and Gulf countries; the African, Caribbean and Pacific Energy Facility; the EURO-SOLAR Programme in Latin America; and the Global Energy Efficiency and Renewable Energy Fund. For the impact assessment of EU common and coordinated PaMs, Germany referred to the NIR of the EU.

III. Conclusions and recommendations

115. The ERT concludes that the NC5 generally provides a good overview of the national climate policy of Germany. 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, paragraph 2, of the Kyoto Protocol. During the review, Germany provided additional information in relation to the missing elements.

116. Germany's emissions for 2008 were estimated to be 21.4 per cent below the 1990 level excluding LULUCF and 17.6 per cent below including LULUCF. The reunification of Germany in October 1990 is the most significant event in the modern history of the country and shaped in a unique way its political, social and economic system. It also had a profound impact on the restructuring of the economy, with associated changes in the energy demand and emission levels. In addition, the success in the promotion of RES and energy efficiency improvements significantly contributed to the decarbonization of the economy, influenced emission trends in Germany and, together with successfully implemented waste management measures, boosted the decrease in emissions.

117. In the NC5, Germany presents GHG emission projections for the period from 2010 to 2020 according to a 'with measures' scenario. The projected reduction in GHG emissions under this scenario, in relation to the base year level, is -23.3 per cent by 2010. Thus, the projections indicate that Germany can meet its Kyoto Protocol target (which is a 21 per cent emission reduction compared with the base year level) under the 'with measures' scenario with domestic policies alone, and the Party's GHG emissions are expected to further decrease, to 32.1 per cent below the 1990 level, by 2020.

118. The NC5 contains information on how Germany's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. Germany is not planning to make use of the Kyoto Protocol mechanisms to meet its Kyoto target for the first commitment period, but facilities covered by the EU ETS can use Kyoto units to comply with their targets under the scheme.

119. In continuation of its National Climate Protection Programme from 2000 and 2005, Germany developed its 2007 IECP as the key framework for its climate policy to meet its Kyoto Protocol target. The IECP, together with the Energy Concept 2010, sets mid- and long-term targets for GHG emission reductions of 40 per cent by 2020 and 80-90 per cent

by 2050 compared with the 1990 level. The main cornerstones of both strategies are the expanded use of RES and energy efficiency improvements. These are supported by relevant policy instruments at the federal and regional levels, including: the introduction of the EU ETS; a broad portfolio of energy taxes; other fiscal and economic incentives, such as subsidies and feed-in tariffs; regulations in nearly all sectors; and a strong focus on research and innovative energy technologies, on both the supply and the demand side, in the energy sector.

120. Germany has been very successful in promoting renewable energy, using an effective portfolio of policy instruments including feed-in tariffs. As a result, its market for renewable electricity is sizeable and fast growing, in particular regarding wind power, and several associated positive socio-economic effects can be identified, such as the creation of new green jobs, economic growth and increased energy security. The ERT concluded that the progress of Germany in promoting renewable energy and related mitigation effects is remarkable.

121. In recent years, Germany significantly increased its bilateral climate-related ODA, to USD 2,206.6 million in 2008 compared with USD 581.4 million in 2004. Concerning multilateral climate change funds, Germany is the third largest contributor to the GEF and committed EUR 347 million for GEF 5, which corresponds to 13.5 per cent of new donor funding and an increase of 62 per cent compared with its contribution to GEF 4. Germany supports financing and transfer of technical equipment, know-how and experience, mainly for the purposes of mitigation and to a lesser extent also for adaptation.

122. In 2008, Germany developed its Strategy for Adaptation to Climate Change as a framework for assessing the climate change risks, identifying the possible relevant requirements for action and defining relevant objectives. Key adaptation options, strategies and measures for each vulnerable sector have been identified and the further development and implementation of adaptation measures will take place within the framework of the Action Plan that will be developed in 2011.

123. In its NC5, Germany provided extensive information on its actions relating to research and systematic observation, addressing both domestic and international activities, as well as information on its domestic and international actions related to education, training and public awareness.

124. The ERT concluded that Germany's national system 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 the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. 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.

125. 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 2010 annual submission is, although limited, complete and transparent. The ERT encourages Germany to further enhance the reporting on Article 3, paragraph 14, including by indicating the prioritization of the action taken in implementing its commitments under Article 3, paragraph 14.

126. In the course of the IDR, the ERT formulated several recommendations relating to the completeness and transparency of Germany's reporting under the Convention and its Kyoto Protocol. The key recommendations⁶ are that Germany:

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

- (i) The estimated total effect of its PaMs;
- (ii) A clarification of how it has determined financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention as being "new and additional";
- (iii) A description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources;
- (iv) Information on the national registry in accordance with paragraph 32 of the annex to decision 15/CMP.1;

(b) Improve the transparency of its reporting by:

- (i) Providing all mandatory reporting elements in the national communication rather than in a separate file, and including references if more detailed information is given elsewhere;
- (ii) Providing more concrete information on its cooperation with developing countries in preparing for adaptation;
- (iii) Following more closely the structure outline contained in the annex to the UNFCCC reporting guidelines when reporting on financial resources and transfer of technology.

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

- (a) Provide more detailed information on factors affecting its GHG emissions;
- (b) Report also on non-mandatory reporting elements, including summary tables of PaMs by sector; information on the monitoring and evaluation of PaMs; a quantification of emission reduction effects for all sectors; and a description of the PaMs influencing GHG emissions from international transport and activities regarding forestry;
- (c) Further elaborate on its methodologies and approaches for impact assessment, vulnerability and adaptation;
- (d) Consider how climate-related skills could be focused more specifically in vocational training.

IV. Questions of implementation

128. 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.

⁶ The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

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

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

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

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

FCCC/SBI/2011/INF.1. Compilation and synthesis of fifth national communications. Available at <<http://unfccc.int/resource/docs/2011/sbi/eng/inf01.pdf>>.

FCCC/SBI/2011/INF.1/Add.1. Compilation and synthesis of fifth national communications. Addendum. Policies, measures, and past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <<http://unfccc.int/resource/docs/2011/sbi/eng/inf01a01.pdf>>.

FCCC/SBI/2011/INF.1/Add.2. Compilation and synthesis of fifth national communications. Addendum. Financial resources, technology transfer, vulnerability, adaptation and other issues relating to the implementation of the Convention. Available at <<http://unfccc.int/resource/docs/2011/sbi/eng/inf01a02.pdf>>.

FCCC/SBI/2011/INF.2. Compilation and synthesis of supplementary information incorporated in fifth national communications submitted in accordance with Article 7, paragraph 2, of the Kyoto Protocol. Available at <<http://unfccc.int/resource/docs/2011/sbi/eng/inf02.pdf>>.

FCCC/ARR/2009/DEU. Report of the individual review of the annual submission of Germany submitted in 2009. Available at <<http://unfccc.int/resource/docs/2010/arr/deu.pdf>>.

FCCC/IRR/2007/DEU. Report of the review of the initial report of Germany. Available at <<http://unfccc.int/resource/docs/2007/irr/deu.pdf>>.

FCCC/IDR.4/DEU. Report of the centralized in-depth review of the fourth national communication of Germany. Available at <<http://unfccc.int/resource/docs/2008/idr/deu04.pdf>>.

Fourth national communication of Germany. Available at <<http://unfccc.int/resource/docs/natc/gernc4.pdf>>.

2009 greenhouse gas (GHG) inventory submission of Germany. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php>.

2010 GHG inventory submission of Germany. Available at
 <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Martin Weiss (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety), including additional material on updated policies and measures, GHG projections, the national registry and recent climate policy developments in Germany. The following documents¹ were also provided by Germany:

Federal Ministry of Economics and Technology, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. 2010. *Energy Concept for an environmentally sound, reliable and affordable energy supply*. Berlin.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Federal Ministry for Economic Cooperation and Development. 2010. *Climate Challenges, Germany's international approach*. Berlin.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. 2009. *Renewable Energies, innovations for a sustainable future*. Berlin.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. 2010. *Erneuerbare Energien 2010 (Renewable Energies 2010)*. Berlin.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. 2011. *Renewable Energy Sources in Figures, national and international development*. Berlin.

Umweltbundesamt. 2009. *Politiksznarien für den Klimaschutz V – auf dem Weg zum Strukturwandel, Treibhausgas-Emissionsszenarien bis zum Jahr 2030 (Policy Scenarios V)*. Dessau-Roßlau.

Prognos AG, EWI GWS. 2010. *Energieszenarien für das Energiekonzept der Bundesregierung (energy scenarios for the energy concept)*. Study for the Federal Ministry of Economics and Technology. Basel/Köln/Osnabrück .

¹ Reproduced as received from the Party.