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Report of the individual review of the greenhouse gas inventories of Germany submitted in 2007 and 2008*

* In the symbol for this document, 2008 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of Germany, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the twenty-seventh session of the Subsidiary Body for Implementation at its twenty-seventh session,[1] the focus of the review is on the most recent (2008) submission. The review took place from 22 to 27 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Michael McGettigan (Ireland), Mr. Paul Filliger (Switzerland); energy – Mr. Hongwei Yang (China), Mr. Tinus Pulles (Netherlands); industrial processes – Mr. Koen Smekens (Belgium), Mr. Dušan Vacha (Czech Republic); agriculture – Mr. Steen Gyldenkaerne (Denmark), Mr. Mahmoud Medany (Egypt); land use, land-use change and forestry (LULUCF) – Mr. Sandro Federici (Italy), Mr. Peter Stephens (New Zealand); and waste – Mr. José Villarin (Philippines), Mr. Hiroyuki Ueda (Japan). Mr. McGettigan and Mr. Villarin were the lead reviewers. The review was coordinated by Mr. Vitor Gois Ferreira and Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), a draft version of this report was communicated to the Government of Germany, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Inventory submission and other sources of information

3. The 2008 inventory was submitted on 15 April 2008 (common reporting format (CRF) tables) and 13 May 2008 (national inventory report (NIR)); it contains a complete set of CRF tables for the period 1990–2006 and an NIR. This is in line with decision 15/CMP.1. The Party indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol.[2] In its 2007 submission, Germany included a complete set of CRF tables for the period 1990–2005 and an NIR. Germany officially submitted revised emission estimates on 15 October 2008 in response to questions raised by the expert review team (ERT) during the review. Where needed the ERT also used previous years' submissions, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2006 (as reported in the 2008 annual inventory submission), the main GHG in Germany was carbon dioxide (CO_2), accounting for 87.6 per cent of total GHG emissions[3] expressed in CO_2 eq, followed by nitrous oxide (N_2O) (6.3 per cent) and methane (CH_4) (4.5 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) (hereinafter referred to as F-gases) collectively accounted for 1.6 per cent of the total GHG emissions. The energy sector accounted for 81.5 per cent of the total GHG emissions, followed by industrial processes (10.8 per cent), agriculture (6.3 per cent), waste (1.3 per cent) and solvent and other product use (0.1 per cent). Total GHG

[1] FCCC/SBI/2007/34, paragraph 104.

[2] Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

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

emissions amounted to 1,004,793.82 Gg CO_2 eq and decreased by 18.4 per cent between the base year[4] and 2006. In 2005 (as reported in the 2007 annual inventory submission), total GHG emissions amounted to 1,001,475.71 Gg CO_2 eq. The shares of gases and sectors in 2006 (2008 annual inventory submission) were similar to those in 2005 (2007 inventory submission).

5. Tables 1 and 2 show GHG emissions by gas and by sector, respectively.

D. Key categories

6. Germany has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2008 submission. The key category analysis performed by the Party and that performed by the secretariat[5] produced similar results, though Germany used a higher degree of disaggregation in the energy sector resulting in more key categories. Germany has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The 2007 submission contains a tier 2 key category analysis. Germany stated in its NIR that a tier 2 analysis will be conducted every three years.

7. Almost the same key categories were identified in the 2007 submission. The following key categories were identified in the 2008 submission but not in the 2007 submission: CO_2 from manufacturing industries and construction – food processing; CO_2 from manufacturing industries and construction – other; and CH_4 from road transportation. The following key category was identified in the 2007 submission but not in the 2008 submission: CO_2 from transportation – other. The key category analysis is a driving factor for the preparation of the inventory and Germany is using it to prioritize the development and improvement of the inventory.

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[4] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

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

Table 1. Greenhouse gas emissions by gas, 1990–2006

Greenhouse gas emissions	Gg CO_2 eq								Change base year–2006 (%)
	Base year[a]	1990	1995	2000	2003	2004	2005	2006	
CO_2	1 032 776.20	1 032 172.26	920 788.52	883 392.20	900 813.23	899 818.53	876 810.76	880 253.44	–14.8
CH_4	99 794.73	99 266.15	81 476.20	64 704.44	53 757.30	49 582.78	47 678.20	45 878.79	–54.0
N_2O	84 408.40	84 388.42	77 304.27	59 064.11	61 978.56	64 197.73	65 697.13	62 931.04	–25.4
HFCs	6 476.87	4 368.78	6 471.66	6 469.43	8 381.28	8 668.88	9 361.72	9 814.76	51.5
PFCs	1 749.60	2 707.58	1 749.60	785.69	857.57	830.41	718.27	582.28	–66.7
SF_6	7 223.76	4 784.96	7 220.27	5 078.15	4 311.09	4 485.52	4 734.34	5 333.49	–26.2

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

Table 2. Greenhouse gas emissions by sector, 1990–2006

Sectors	Gg CO_2 eq								Change base year–2006 (%)
	Base year[a]	1990	1995	2000	2003	2004	2005	2006	
Energy	987 871.48	987 692.15	871 146.00	828 119.06	845 290.89	840 643.81	819 361.79	818 904.99	–17.1
Industrial processes	123 738.51	119 799.02	121 275.07	100 929.45	102 971.55	107 062.86	107 139.20	108 177.85	–12.6
Solvent and other product use	2 088.54	2 088.54	1 672.86	1 257.18	1 174.04	1 174.04	1 174.04	1 174.01	–43.8
Agriculture	78 302.34	77 684.94	66 589.25	67 121.81	64 286.95	63 957.10	63 542.44	62 948.91	–19.6
LULUCF	NA	–28 240.83	–31 161.86	–33 932.66	–35 448.63	–35 830.80	–36 075.63	–36 398.92	NA
Waste	40 428.68	40 423.50	34 327.35	22 066.53	16 375.60	14 746.05	13 782.95	12 994.53	–67.8
Other	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total (with LULUCF)	**NA**	**1 199 447.32**	**1 063 848.67**	**985 561.36**	**994 650.40**	**991 753.06**	**968 924.80**	**968 394.90**	**NA**
Total (without LULUCF)	**1 232 429.54**	**1 227 688.15**	**1 095 010.53**	**1 019 494.02**	**1 030 099.04**	**1 027 583.86**	**1 005 000.43**	**1 004 793.82**	**–18.5**

Abbreviations: LULUCF = land use, land-use change and forestry; NA = not applicable; NO = not occurring.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

E. Main findings

8. The inventory is generally in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, and is supported by an elaborate NIR. The inventory submission under review is generally in line with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) and is generally of a satisfactory quality, but the ERT identified a need for improvement in reporting for the agriculture and LULUCF sectors.

9. Germany's estimates for agriculture in 2006 were carried forward from those previously reported for 2005. Germany explained in the NIR that a new method based on recognized international scientific literature was used for the first time to calculate the agricultural emissions, but that the results of the new method differed considerably from those obtained with the earlier method. As a temporary measure, the 2005 estimates were carried forward. The ERT recognizes that Parties should make every effort to improve the inventory and to use the best available methods, but this should not be the basis for suspending the use of existing methods to report for the latest year. Thus, in order to maintain consistency with previous years' submissions the ERT requested that Germany provide emission estimates for agriculture for 2006, prepared using the established methodologies for the sector. Germany provided the estimates and resubmitted tables 4s1, 4s2, 4.A, 4.B(a)s1, 4.B(b), and 4.Ds1, and summary table 2. Greater clarity is required in Germany's description of its nitrogen (N) accounting, in relation to the estimation of N_2O from agricultural soils.

10. Germany has not submitted updated information for the LULUCF sector in its 2007 and 2008 NIRs, and refers instead to the 2006 NIR. The NIR does not provide sufficient information on land-use definitions and correspondence to the LULUCF categories and the land areas and land-use databases used for the inventory preparation. It also does not explain the assumptions used in the extrapolations and interpolations of activity data (AD) and emission/removal estimates. Therefore it is not possible to understand how the AD were derived and how land-use changes have been tracked. During the review, the ERT was informed of Germany's current effort to improve the implementation status of the national system for reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT strongly recommends that high priority be given to this task and that Germany report on its efforts in its next annual submission.

11. The uncertainty analyses provided by Germany are incomplete. The ERT recommends that Germany include information on trend uncertainty in the NIR. During the review process, Germany informed the ERT that trend uncertainty will be included in the next annual submission.

F. Cross-cutting issues

1. Completeness

12. The inventory is complete in terms of years, gases, sectors and geographic coverage. However, the inventory is not fully complete in terms of categories, with many reported as not estimated ("NE") across all sectors in table 9. Germany has provided explanations in table 9 and annex 5 of the NIR. For many of the "NE" categories, Germany states that the categories will be checked. The ERT commends the effort of the Party to make the inventory as complete as possible, and encourages Germany to provide, in its next submission, estimates for all categories reported as "NE", for which methods are available in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, in order to prevent possible underestimation of emissions during the commitment period.

2. Transparency

13. The NIR provides most of the information necessary to fully assess the inventory. Greater transparency in the agriculture and LULUCF sectors is recommended. The NIR and CRF are largely consistent, with some exceptions. The method descriptions in CRF table Summary 3 are different from those in the NIR for some categories (e.g. manufacturing industries and construction and fuel combustion – other sectors). Germany explained, in response to issues raised in previous 2008 review stages, that the information in the CRF is correct and that the differences are due to problems with the CRF Reporter software and a mismatch between the strong aggregation of CRF table Summary 3 and the more detailed tables in the NIR chapters; the differences will be checked in the next submission.

3. Recalculations and time-series consistency

14. Germany has reported recalculations for all years from 1990 to 2005 in the energy sector (CO_2, CH_4 and N_2O), the industrial processes sector (CO_2, CH_4, N_2O, HFC and SF_6) and the waste sector (CH_4 and N_2O), and comprehensive explanations are provided in both the CRF and NIR. Recalculations are based on improvements, resulting in only minor changes to emission estimates, mostly updates of AD. No recalculations have been undertaken in the agriculture, LULUCF and solvent and other products use sectors. For 1990 to 2003 only marginal changes in emissions result from the recalculations of the total emissions. In 2004 and 2005 a substantial recalculation was made for category fuel combustion (other sectors) following the update of the tables by the German Working Group on Energy Balance. The recalculations have resulted in real improvements to the inventory.

4. Uncertainties

15. In the 2008 submission, Germany has provided a tier 1 uncertainty level analysis for 2006, but it does not cover all categories. A complete set of uncertainties, determined by expert assessment, is not yet available. Uncertainty estimates are available for 95 per cent of the emissions. Categories without uncertainty estimates are mainly from the energy sector. In the 2007 submission Germany has provided, for the first time, a tier 2 uncertainty analysis which covers all sectors and gases but only those categories for which uncertainty estimates were available. Germany plans to conduct the tier 2 analysis every three years. No information on the uncertainty in the trend can be found in either the 2007 or 2008 submission.

16. The level uncertainty of total emissions estimated using the tier 1 approach is $\pm$ 12.5 per cent (2008 submission). According to the tier 2 analysis provided in the 2007 submission, uncertainty varies from –5.8 to +11.9 per cent, showing that tier 1 and tier 2 results compare well. However, the tier 1 uncertainty estimates for AD in some categories are higher than expected (e.g. public electricity and heat production – solid fuels and railways – liquid fuels). Further investigations of the uncertainty estimates in the agriculture and LULUCF sectors are mentioned in the NIR. During the review, Germany stated that work is underway to complete the uncertainty assessment, and that trend uncertainty will be included in the next annual submission. The ERT commends Germany's effort.

5. Verification and quality assurance/quality control approaches

17. Germany has elaborated a quality assurance/quality control (QA/QC) plan in accordance with the IPCC good practice guidance. It outlines a framework for QA/QC systems, which is complemented by detailed definition of the roles for the Ministries involved in the inventory preparation. This system, presented in the "National system principles paper on emissions reporting", included in annex 6 to the NIR, and which came into force on 5 June 2007, defines the overall responsibilities and collaboration among the seven Ministries involved in the inventory preparation. The paper also refers to existing QA rules, defines the tasks of a coordinating committee, and outlines proper data provision and funding procedures.

18. The NIR states that CO_2 emissions data from the European Union emissions trading scheme (EU ETS) are available, but Germany makes no direct use of the EU ETS data for the GHG inventory, even though the ERT considers it to be a reliable and extensive source of emissions and energy-use data that could be used for additional QC. The ERT recommends that Germany continue to explore the use of the EU ETS data as a means to improve QA/QC in inventory preparation and reduce uncertainties, and explain its use of this data in its next annual submission.

6. Follow-up to previous reviews

19. The principles outlined in the policy paper "National system principles paper on emissions reporting", presented during the in-country review of the initial report, have been implemented to further support the implementation of Germany's national system. In 2007 Germany provided, for the first time, a tier 2 uncertainty analysis which will be updated every three years. The ERT noted that Germany has not yet followed up on some of the recommendations from previous ERTs, such as improving the timeliness of the national energy balance (during the review, Germany stated that this issue in particular is currently being addressed in the national system).

G. Areas for further improvement

1. Identified by the Party

20. The 2008 NIR identifies several areas for improvement. The NIR states that the German inventory is currently being subjected to an intensive internal review in which the conformity of the applied methods to the IPCC good practice guidance is being systematically reviewed, and methodological changes are being implemented. Improvements are reported in several categories of the energy, industrial processes and waste sectors. The NIR reports that in the agriculture sector a new methodology based on recognized international scientific literature is being developed but is not yet ready to be implemented in the inventory.

2. Identified by the expert review team

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

(a) Germany should continue its efforts to complete and strengthen the well developed national system, for example: fully implementing the QA/QC plan; securing the timely completion of the energy balance; achieving agreement between the Federal Statistical Office and the Federal Agricultural Research Institute (FAL) regarding confidentiality issues and availability of agricultural statistics; eliminating data problems relating to railway transport; reaching agreement with the European Organization for the Safety of Air Navigation (EUROCONTROL) on data exchange; and developing an integrated concept for land-use monitoring in the LULUCF sector. During the review, Germany informed the ERT that this issue has been improved since the 2008 submission. The ERT recommends that Germany report on the progress it is making in its next annual submission;

(b) Germany is encouraged to continue working to improve the completeness of the uncertainty analyses by providing uncertainty estimates for all categories. The calculation of trend uncertainty according to the IPCC good practice guidance and the IPCC good practice guidance on LULUCF should be included in the NIR;

(c) Germany must ensure that the national system functions in such a way that consideration of a general change to the latest IPCC methodologies for agriculture is resolved in a timely manner and is not a reason for suspending the use of existing methods, or for not

reporting the latest year estimates in a manner consistent with previous years. In the next submission, the Party should provide a transparent description of the new method and include a separate chapter in the NIR which compares the two methods. Germany should further improve the existing methodologies for calculating emissions from the agriculture sector, particularly for N_2O from agricultural soils;

(d) Germany should give high priority to improving transparency in the LULUCF sector. The LULUCF sector has not been updated since the 2006 submission and no improvement plan has been mentioned;

(e) Germany should provide estimates of emissions and removals for the categories reported as "NE", if methods are available, with a view to avoiding problems and possible underestimation during the commitment period.

22. Recommended improvements relating to specific source/sink categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

23. The energy sector is the main sector in the GHG inventory of Germany. In 2006, emissions from the energy sector amounted to 818,904.99 Gg CO_2 eq, or 81.5 per cent of total GHG emissions. Since 1990, total GHG emissions have decreased by 17.1 per cent. The NIR states that the key drivers for the fall in emissions are a shift in the fuel mix and increased energy efficiency. Within the sector, 45.2 per cent of emissions were from energy industries, 20.9 per cent were from other sectors, 19.8 per cent were from transport and 12.5 per cent were from manufacturing industries and construction. Fugitive emissions accounted for 1.4 per cent and the remaining 0.2 per cent were from category other (1.A.5).

24. The inventory of GHG emissions for the energy sector is of high quality, transparent and complete. The sources of AD and emission factors (EFs) and their applicability are well described in the NIR. CO_2 emissions from major stationary combustion installations account for a large proportion of total emissions from the energy sector in Germany, and a large proportion of such emissions are covered by the EU ETS. However, there is little direct use of EU ETS data in compiling the national inventory. The NIR states that EU ETS data have been used to improve quality and identify gaps, and for comparison purposes. The ERT believes that more direct use should be made of EU ETS data for the energy sector; this would allow for a more efficient and systematic application of this important data source.

B. Reference and sectoral approaches

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

25. The CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2006, CO_2 emissions calculated using the reference approach are 0.85 per cent higher than those calculated using the sectoral approach.

26. In the reference approach (CRF table 1.A(b)) Germany uses a conversion factor of 0.001 TJ/unit for gas/diesel, residual fuel oil, liquefied petroleum gas and cooking coal; this appears to be inconsistent with the unit (TJ) that is used for production, imports, exports, international trade and stock change in the same table. When this is corrected, the apparent consumption of fuels reported to the UNFCCC in the reference approach corresponds closely to that reported by the International Energy Agency (IEA), with

differences of no more than 1 per cent every year, except for 2005 (1.9 per cent). Germany clarified that this is a reporting error that will be corrected in the next submission.

27. There are discrepancies between CRF tables 1.C and 1.A(b) for gas/diesel oil and residual fuel oil (international marine bunkers) for 2005 and 2006. Germany indicated that this results from the use of data with different origins in each table. The ERT encourages Germany to correct the values where necessary.

2. International bunker fuels

28. Emissions from consumption of international aviation fuels are estimated assuming that 80 per cent of total jet kerosene is used in international bunkers for all years. This value is based on studies of flight movements in the 1990s. However, in the NIR, Germany states that there are indications that international aviation is growing faster than domestic aviation, meaning that emissions from international bunker fuels reported for the most recent inventory years could be underestimated, and the emission estimates for domestic aviation could be overestimated in the same period. In the NIR Germany refers to a planned research project to improve emission estimates for the years following 1995 and, during the review, Germany explained that in its next annual submission it will use a split of international and domestic bunkers specific for each year and based upon information from the EUROCONTROL. The ERT welcomes this planned improvement and recommends that Germany carry out the studies.

C. Key categories

1. Stationary combustion: liquid fuels – CO_2

29. Germany reports the AD for blast furnace gas in category iron and steel in the energy sector, whereas the associated CO_2 emissions are reported under the category iron and steel production in the industrial processes sector. The implied emission factor (IEF) for these categories therefore cannot be easily compared to those of other Parties. In response to questions from the ERT, Germany stated that the exact reallocation of AD would require an immense effort. The ERT proposes that Germany investigate whether an approximate method could be used.

2. Underground mines: solid fuels – CH_4

30. Germany estimates emissions of CH_4 from underground coal mining from gas composition and air flow measurements made by mine operators and aggregated by the German hard-coal mining industry (Gesamtverband des deutschen Steinkohlebergbaus). IEFs decreased over time, which is partly explained by an increasing fraction of pit gas being recovered for energy. The ERT recommends that Germany include a table with the time series of pit gas recovered in its next NIR.

D. Non-key categories

Stationary combustion: liquid and solid fuels – CO_2

31. The CO_2 emissions from stationary combustion in 2006 (636.2 Gg) were 68.0 per cent of the emissions in 1990 (1,989.2 Gg). The emissions from this category showed a sudden decrease from 2001 to 2002 (1,609.20 to 367,06 Gg) and this pattern closely followed total consumption of liquid fuels in this category. In response to questions from the ERT, Germany indicated that the time series of emissions and AD will be corrected in the 2009 submission. Furthermore, the AD reported in this category represent less than 15 per cent (until 2001) or less than 3 per cent (since 2002) of the equivalent fuel use data reported by the IEA for the food and tobacco industry, revealing a possible underestimation of emissions. In response to questions from the ERT, Germany indicated that the IEA uses data entry forms and a calculation methodology that differ substantially from the ones used by the inventory team in

Germany. Therefore the resulting data are only partially comparable. Due to limitations of available data sources, only emissions from the sugar industry class of the IEA can be reported separately under CRF category food processing, beverages and tobacco; while emissions from the other products included in the food and tobacco industries category of the IEA are included in the CRF category other manufacturing industries and construction (1.A.2.f).

III. Industrial processes and solvent and other product use

A. Sector overview

32. In 2006, emissions from the industrial processes sector amounted to 108,177.85 Gg CO_2 eq, or 10.8 per cent of total GHG emissions. Emissions from the solvent and other product use sector amounted to 1,174.01 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Between the base year and 2006, emissions from the industrial processes sector decreased by 12.3 per cent and emissions from the solvent and other product use sector decreased by 43.8 per cent. The key drivers for the fall in emissions are chemical industry, production of halocarbons and SF_6, metal production and mineral products, whereas emissions from consumption of halocarbons and SF_6 partially offset the emission decrease. Within the industrial processes and solvent and other product use sectors, 74.0 per cent of GHG emissions were CO_2, 11.6 per cent were N_2O, 9.0 per cent were HFCs and 4.9 per cent were SF_6. PFCs accounted for 0.5 per cent and CH_4 emissions were negligible.

33. As for the energy sector, there is little direct use of EU ETS data in compiling the national inventory for industrial processes. The ERT believes that more direct use could be made of EU ETS data for those categories for which the number of industrial facilities included provide a complete or near-complete coverage of all activity in the industrial sector.

34. In the solvent and other product use sector, only N_2O and non-methane volatile organic compound (NMVOC) emissions are reported. Germany assumes N_2O emissions to be constant for the years 2001–2006. During the review, Germany stated that it is making the effort to revise this "constant" approach and also to estimate CO_2 emissions. The ERT encourages Germany to implement these decisions and provide estimates for other gases and categories in order to improve the completeness of the inventory.

35. The ERT noted the continued work on recalculation of emissions from previous submissions in the following categories: ceramics, metal production, primary aluminium production (2007 submission), glass production, consumption of halocarbons and SF_6 (2008 submission).

B. Key categories

1. Cement production – CO_2

36. Germany uses a tier 2 approach to calculate emissions from cement production on the basis of clinker production, as required by the IPCC good practice guidance, and uses country-specific calcium oxide (CaO) content, which is slightly higher than the IPCC default value. The ERT noted that Germany indicated in its 2006 submission that it would verify the EFs used. There is no indication in the 2007 and 2008 inventory submissions that this happened. The ERT reiterates the recommendations from previous reviews that the Party look into this and report its findings in its next NIR, and apply a periodical update of the EFs in the future.

2. Lime production – CO_2

37. Germany has reported emissions from lime production in several categories corresponding to industrial sectors were lime is produced or used (e.g. iron and steel, sugar production). This makes the

inventory more complex and less transparent. The ERT encourages Germany to increase transparency and provide more information about emission estimates from lime production in these other categories.

3. Ammonia production – CO_2

38. The NIR states that there are only five ammonia producers in Germany, which use synthetic gas based on natural gas or gasification of fractions of heavy mineral oil or vacuum residues as feedstock materials for ammonia production. The ERT reiterates the recommendation from the initial review report and encourages Germany to estimate emissions from the amount of feedstock use rather than from ammonia production data.

4. Nitric acid production – N_2O

39. Germany uses tier 1 nitric acid production data to calculate N_2O emissions from nitric acid production. This is not in line with the IPCC good practice guidance, because this is a key category. The ERT reiterates the recommendation from the initial review report that Germany use plant-specific data to estimate N_2O emissions from nitric acid production for its next submission.

5. SF_6 used in aluminium and magnesium foundries – SF_6

40. AD are based on sales statistics instead of plant-specific consumption data. The ERT reiterates the recommendation from the initial review report, and encourages Germany to compare this dataset with data obtained directly from aluminum and magnesium foundries that use SF_6.

C. Non-key categories

Limestone and dolomite use – CO_2

41. The CO_2 emissions from limestone and dolomite use are reported as included elsewhere ("IE"). The NIR explains that these emissions are reported in public electricity and heat production (flue gas desulphurization in power stations), other (mineral products (ceramics – brick production)) and iron and steel production (limestone input for raw iron and sinter). This allocation of emissions does not change the level of total emissions, and emissions are allocated to the actual sector where they occur. However, this procedure reduces the comparability of the IEFs for the categories where the emissions are included. The ERT recommends that Germany follow the Revised 1996 IPCC Guidelines and account for all CO_2 emissions from limestone use in the category limestone and dolomite use.

IV. Agriculture

A. Sector overview

42. In Germany's original 2008 submission, the emission estimates for the agriculture sector in 2006 were carried forward from 2005 with an explanation in the NIR that Germany was not in a position to submit a 2006 inventory for the agricultural sector. In response to questions on this matter during the review, Germany provided revised estimates for 2006. The review is therefore conducted on the basis of the 2007 NIR, which reflects Germany's established methodologies for the agriculture sector, and the revised 2006 estimates. The revised estimates received during the review have some minor errors in the estimation of N_2O emissions from sewage sludge used in agriculture. No recalculations were performed for the years 1990–2005.

43. For the inventory year 2006, emissions from the agriculture sector amounted to 62,948.91 Gg CO_2 eq, or 6.5 per cent of total GHG emissions. The emissions from the agriculture sector decreased by 19.0 per cent between 1990 and 2006. The key driver for the fall in emissions is a decrease in the number of cattle and a lower consumption of mineral fertilizer. Within the sector, 59.1 per cent of

emissions were from agricultural soils, 28.4 per cent were from enteric fermentation and 12.5 per cent were from manure management. Removals of CH_4 are reported for agricultural soils.

44. The inventory for agriculture uses country-specific methodologies, in accordance with the IPCC good practice guidance. For cattle and swine, an enhanced livestock characterization is applied consistently across all categories. In particular, the input parameters applied for the estimations of gross energy intake, volatile solid excretion rate and N excretion rates (N_{ex}) are obtained from official published studies and reflect German conditions for dairy cattle, non-dairy cattle and pigs. For all other animal categories, Germany uses the default IPCC values, which is in line with the IPCC good practice guidance.

45. The ERT acknowledges the use of the higher tiers, but Germany could further improve the transparency of the NIR by providing more detailed references and background information on the supporting studies. No AD are reported in the NIR. Some tables of the most pertinent AD used should be included in the NIR, such as livestock numbers and total mineral fertilizer consumption. If data are different from those given in the official statistics, the rationale for this should be described. Additionally, a description of the most important trends in AD should be added. Germany could do this if, together with the submission of the inventory, it includes in the NIR relevant information from the report Sonderheft 304 from the FAL and any updates, which describe most of the processes.

46. Livestock numbers are collected only every two years in Germany. For the years when no new census is undertaken, Germany uses the numbers from the previous year. The ERT recommends that Germany extrapolate the numbers of animals to the inventory year to improve the time-series consistency of the inventory.

47. Emissions from asses and mules are reported as "NE", as the pertinent emissions are considered negligible (according to the NIR, the number of animals is about 6,000–8,000 asses and 500 mules). Although the emissions are small, the ERT suggests that these animals be accounted for in the inventory.

B. Key categories

1. Enteric fermentation – CH_4

48. The CH_4 emissions from enteric fermentation of dairy and non-dairy cattle are estimated using a tier 2 methodology. Although CH_4 emissions from swine is not a key category, a tier 2 methodology has also been applied. The CH_4 emissions from other animals are estimated using a tier 1 approach. This is in line with the IPCC good practice guidance. Gross energy intake of dairy and non-dairy cattle was calculated following the IPCC procedure, based on the feed requirements of the animals and the actual feed composition. The calculations resulted in CH_4 IEFs for non-dairy cattle (37.16 kg/head) that are considerably lower than the IPCC default for Western Europe (48 kg/head). The lower values can be explained by the specific age and breed composition of this animal category, resulting in low animal weights and lower required energy demand, as explained in the Sonderheft 304 report. However, the ERT reiterates the recommendation that Germany provide, in its next NIR, more information on gross energy intake, corresponding milk yields and other parameters underlying the country-specific EFs.

2. Manure management – CH_4

49. For the storage of liquid manure, the methane conversion factor (MCF) of 10 per cent listed in the Revised 1996 IPCC Guidelines has been used rather than the MCF of 39 per cent listed in the IPCC good practice guidance. Germany explained that the applied value better reflects the current state of science, which is acknowledged by the ERT. Germany stated that it will use the latest scientific literature available and a revised distribution of the existing storage systems for the 2008 submission. It is recommended that Germany update the emission estimates in future submissions.

3. Direct soil emissions – N_2O

50. The estimation of N_{ex} in table 4.B does not seem to account for all N excreted by sheep. Germany reports only 3.5 million tonnes of N, whereas the ERT estimates the amount to be about 16 million tonnes of N from grazing sheep. The ERT recommends that Germany, in its next submission, verify the calculations in table 4.B(b) and ensure that all excreted N is taken into account.

51. The N_2O emissions from imported manure were mentioned in the NIR in 2006 and included in a separate line in CRF table 4.Ds1. In the 2007 and 2008 submissions, imported manure is not mentioned in the NIR and the corresponding entry no longer appears in the revised CRF table. During the review, Germany confirmed that the information in the footnote to CRF table 4.Ds1 is correct and that imported manure is indeed included in the amount applied to agricultural soils. The ERT recommends that Germany continue to explore the possibility of including emissions from manure that is imported from other countries and applied to German agricultural soil, and to improve reporting in its next annual submission.

52. The fractions $Frac_{NCRBF}$, $Frac_{NCRO}$ and $Frac_R$ are reported as "NE" in table 4.Ds2 although the methodology that Germany used allows for the calculations of these fractions. The ERT recommends that Germany include these values in the CRF for comparison with the values reported by other Parties. During the review, Germany stated that it will provide this information in its next annual submission.

4. Indirect emissions – N_2O

53. The ERT was not able to reconstruct the ammonia emissions estimate in the German inventory. As a result of the mass-flow approach used by Germany, the amount of N used as AD for calculating atmospheric deposition is not consistent with the amount of N used for synthetic fertilizer and manure in the CRF and the reported values for $Frac_{GASF}$ and $Frac_{GASM}$ Similarly, the amount of N used as AD for calculating leaching and run-off is not consistent with the data reported for the amount of N for synthetic fertilizer and manure in the CRF and the $Frac_{LEACH}$. This issue was raised in the initial review report. During the present review, Germany provided reasons for the observed inconsistencies in the tables, but neither the latest submission nor the answers to questions from the ERT during the review clarified the issue. The ERT recommends that Germany include a simple mass balance calculation for the overall N flow in the German agriculture sector with explanations of how the values in the CRF tables have been calculated. The ERT also recommends that Germany make the effort to report in the CRF tables AD, emissions and $Frac_{GASF}$ and $Frac_{GASM}$ in a manner that is more transparent, consistent with the UNFCCC reporting guidelines and comparable to other Parties.

C. Non-key categories

Direct soil emissions – CO_2

54. In the 2007 inventory Germany has, for the first time, included CO_2 emission from urea applied to soil. The total CO_2 emissions are estimated at 600 Gg CO_2 for 2005 and 2006 in the 2008 NIR, but the corresponding values do not appear in the CRF tables. In response to questions on this matter, Germany stated that the values were omitted in error and that it would include the emissions in the next annual submission. The ERT recommends that Germany ensure that the reporting of emissions from urea application does not lead to double counting of CO_2 emissions from ammonia production. Germany is encouraged to provide further clarification of its methods to allow for the complete review of this item in the future and to allocate emissions to categories in accordance with the Revised 1996 IPPC Guidelines.

V. Land use, land-use change and forestry

A. Sector overview

55. In 2006, the LULUCF sector was a net sink of 36,398.92 Gg CO_2 eq. Net removals from the sector increased by 28.9 per cent between 1990 and 2006. The key driver for the rise in removals is carbon stock changes in land converted to forest land. The removals for this subcategory comprised 0.3 per cent of total emissions and removals in 1990 and 4.1 per cent in 2006. Within the LULUCF sector, 65.0 per cent of GHG emissions/removals were from forest land, 20.9 per cent were from cropland, 13.6 per cent were from grassland, 0.4 per cent were from other land and 01 from other (5.G). Most of the emissions/removals were CO_2, which accounted for 99.7 per cent of the sectoral emissions/removals; N_2O accounted for the other 0.3 per cent. The inventories and the NIR have not been completely updated. The data have been updated only for category forest land; for the other categories, the data from the 2006 NIR have been retained without change. Inventory preparation for all categories and pertinent data sources and methods used, have been not described in the 2007 NIR. The ERT encourages the effort that Germany is making to report a complete set of information for the LULUCF sector in its next NIR.

56. The following net carbon stock changes are reported as "NE": dead organic matter (DOM), mineral soils and organic soils for forest land remaining forest land and land converted to forest land; DOM (with the exception of grassland converted to cropland, which is reported with notation key "NO") and organic soils for cropland remaining cropland and land converted to cropland, and mineral soils for other land converted to cropland; DOM, organic soils and mineral soils (with the exception of cropland converted to grassland) for grassland remaining grassland and land converted to grassland; living biomass (with the exception of forest land converted to both wetlands and settlements), DOM and soil organic matter for wetlands and settlements; DOM and soil organic matter (with the exception of wetlands and settlements converted to other land) for other land; living biomass soil organic matter for cropland and grassland converted to other land; and N_2O emissions from drainage of soils and wetlands. CH_4 and N_2O emissions from biomass burning are reported in the CRF tables with notation key "NO"; Germany explained that biomass burning is prohibited by law. N_2O emissions from disturbance associated with land-use conversion of organic soil have been reported as "NE" although in the CRF tables the notation key "IE" should be applied because these emissions are reported in the agriculture sector under category cultivation of histosols. During the review, Germany clarified that the notation "IE" is correct. The ERT encourages the Party to improve the completeness of its report for the next annual submission, and to provide estimates and relevant information for categories currently reported as "NE".

57. The NIR does not provide sufficient information on the following: land-use definitions or the classification systems used for the LULUCF categories; the areas and land-use data sets used for the inventory preparation; the assumptions used in extrapolations and interpolations of AD and GHG estimates; and documentation on the country-specific methods that are used. In addition, a summary table on the national areas of different land use and land-use change is missing from the QA/QC section. The ERT recommends that Germany improve the transparency of its GHG inventory by providing all the necessary documentation and information in the next NIR.

58. The NIR does not include sufficient information on the approaches and methods used for consistent land representation. Apart from tracking land-use change for cropland and grassland, it appeared to the ERT that Germany has not developed a complete and consistent land representation for all land-use categories. Without consistent land representation, double counting or omission of an area might occur, leading to incorrect estimates of a source or a sink. The ERT observed that only three of the six IPCC land categories have been reported separately. Areas of wetland and settlement have been

included in the category other land. It was therefore difficult for the ERT to track land-use changes and the derivation of the AD (e.g. areas).

59. The ERT recommends that Germany report a consistent representation of total land area in accordance with the IPCC good practice guidance for LULUCF, harmonize its land-use definitions with the IPCC good practice guidance for LULUCF definitions (e.g. for other land, wetlands and settlements) and report each category separately, and provide sufficient documentation on the approaches, methods and data used for land representation in the NIR. The Party responded that in its future submissions, LULUCF-oriented area surveys will be carried out completely, annually and without any double counting, using a digital landscape model (B-DLM/ATKIS) in which all relevant areas will be precisely defined and georeferenced. The ERT strongly encourages the Party to report a complete time series of AD for each land use and land-use change, established in accordance with the IPCC good practice guidance for LULUCF, and to include a complete set of annual land use and land-use change matrices in the next submission.

60. In the context of implementation of the national system for reporting Article 3, paragraphs 3 and 4, activities, and given that Germany has not submitted a complete set of information on the LULUCF sector since its 2006 NIR submission, the ERT strongly encourages the Party to improve the capability of its national system to fulfill the land use monitoring and reporting requirements.

B. Key categories

1. Forest land – CO_2

61. The ERT noted that estimates of AD and, consequently, carbon stock changes of land converted to forest in the new German Länder are incomplete (e.g. with existing data, new forest additions in the old German Länder can only be traced back to 1987; for the new German Länder it has only been possible to derive the net new forest since 1993). Therefore, the ERT strongly encourages Germany to report under category land converted to forest land each carbon stock change occurring in land converted to forest land, and to apply the relevant methodologies provided in the IPCC good practice guidance for LULUCF, in order to reconstruct a complete time series of land-use changes and related changes in carbon stocks.

2. Cropland – CO_2

62. The Party reports changes in carbon stocks in both living biomass and mineral soils. Changes in the living biomass refer also to carbon stocks of annual crops. The ERT noted that within the annual balance of carbon, the living biomass stocks for annual crops are present for only a fraction of the year. After harvesting, they are moved to other pools – the DOM and mineral soils – or are oxidized by respiration. The methodological information reported in the 2006 NIR submission does not clarify whether and how the methodology applied for estimating carbon stock changes in living biomass and mineral soils of cropland remaining cropland and land converted to cropland addresses the temporal (presence of living biomass carbon stocks for a portion of the year) and spatial (presence of the same carbon stock in living biomass and in mineral soils in two different, and subsequent, portions of the same year) factors. Therefore, the ERT recommends that Germany report all the relevant information in the next submission and revise the applied methodologies if it is not able to address the issues raised.

C. Non-key categories

Biomass burning – CH_4, N_2O

63. The ERT noted that CH_4 and N_2O emissions due to biomass burning in forest land have been reported as “NO” although data are provided in the NIR (2006 submission) for wildfires on managed

forest land. Therefore, the ERT recommends that Germany report CH_4 and N_2O emissions due to biomass burning in forest land emissions in its next annual submission.

VI. Waste

A. Sector overview

64. In 2006, emissions from the waste sector amounted to 12,994.53 Gg CO_2 eq, or 1.3 per cent of total GHG emissions. Emissions from the sector decreased by 67.9 per cent between the base year and 2006. Within the sector, 74.0 per cent of emissions were from solid waste disposal on land, 18.9 per cent were from domestic and commercial wastewater, 5.9 per cent were from composting and 1.2 per cent were from mechanical biological solid waste treatment.

65. Since 1990, a number of legal provisions relating to waste management have been introduced and a number of relevant organizational measures have been initiated in Germany. Increased recycling of materials and reuse of organic materials as compost have led to a reduction in the quantity of landfilled waste and hence a 73.2 per cent reduction in CH_4 emissions from solid waste disposal on land between the base year and 2006.

66. Germany reports N_2O emissions from mechanical biological solid waste treatment for the first time in its 2007 submission, using country-specific methods and EFs. These new N_2O emissions amounted to 151.93 Gg CO_2 eq, or 1.2 per cent of emissions for this sector in 2006.

B. Key categories

1. Solid waste disposal on land – CH_4

67. Between the base year and 2006, emissions of CH_4 from solid waste disposal on land decreased considerably, from 1,710.00 to 458.00 Gg CH_4, as a result of decreases in landfilled municipal waste, industrial waste and sewage sludge. An increase in CH_4 recovery also contributes to the decrease of CH_4 emissions from this category.

68. The amount of CH_4 recovered from landfills, estimated at 597.00 Gg CH_4 in 2006, is more than half of the total CH_4 generation in landfills (1,055.00 Gg CH_4 in 2006). Germany estimates the amount of CH_4 recovery using the assumed gas-collection rate of landfills (35 per cent in 1990 and 95 per cent in 2006) and gas collection efficiency (45 per cent in 1990 and 60 per cent in 2006). Since estimates often overestimate the amount of recovery, the ERT recommends that Germany replace the amount of CH_4 recovery from estimated data with actual monitored data.

69. In the 2007 submission, Germany conducts recalculations for this category, but there are only brief explanations of changes in AD (addition of landfilled industrial waste and new statistical data sources for the period 1975–1990), parameters (improved time series for waste fractions, addition of diaper and composite material fractions and different half-lives for different waste fractions) and methodology (expansion of estimation period for multi-phase model back to 1950). But the explanation of recalculations in the 2008 submission ("8.1.1.5 Source-specific recalculations (6.A.1)" in the NIR) is not updated and the text from the 2007 submission is copied. The ERT welcomes the improvements but recommends that Germany provide well-documented explanations about the rationale for and effects of recalculations and quantitative data sets in the NIR.

2. Wastewater handling – CH_4

70. Between the base year and 2006, CH_4 emissions from domestic and commercial wastewater handling decreased considerably, from 106.01 to 5.50 Gg CH_4, due to an 89.8 per cent reduction of organic loads discharged into cesspools and septic tanks and termination of open sludge digestion in

eastern Germany in 1994. The AD for CH_4 emissions from domestic and commercial wastewater in cesspools and septic tanks have been revised and slightly increased in the 2008 submission, but the effect on emissions is insignificant. CH_4 emissions from anaerobic treatment processes are integrated with gas recovery and do not contribute to the emissions in this category. Uncertainties in CH_4 emissions from open sludge digestion have not been estimated.

71. In CRF table 6.B, Germany reports total CH_4 emissions from domestic and commercial wastewater in wastewater, and reports emissions from sludge as "NO". However, the ERT considers that CH_4 emissions from open sludge digestion from 1990 to 1994 should be reported in sludge instead of "NO".

C. Non-key categories

1. Waste incineration – CO_2, CH_4 and N_2O

72. Germany reports CO_2, CH_4 and N_2O emissions from waste incineration in the energy sector because all waste incineration in Germany is carried out "with energy input." This also avoids double counting. However, according to the IPCC good practice guidance, reporting emissions from waste incineration in the energy sector instead of in the waste sector should be done when "emissions with energy recovery" occur. The ERT recommends that Germany revise the reason for reporting emissions from waste incineration in the energy sector.

2. Other – CH_4 and N_2O

73. Germany recalculates CH_4 and N_2O emissions from composting in the 2007 and 2008 submissions, CH_4 emissions from mechanical biological solid waste treatment (MBT) in the 2007 and 2008 submissions, and N_2O emissions from MBT in the 2008 submission, without providing explanations in the NIR. Additionally, neither category is well documented in comparison with other categories in the waste sector. The ERT recommends that Germany provide well-documented descriptions of methodology, EFs and AD used and details of recalculations in the NIR.

VII. Other issues

1. Changes to the national system

74. The Party has not reported on any changes to its national system in the 2008 submission. In response to questions raised by the ERT during the review, the Party confirmed that no changes have been made to the national system.

2. Changes to the national registry

75. The Party has not reported on any changes to its national registry in the 2008 submission. In response to questions raised by the ERT during the review, the Party confirmed that no changes have been made to the national registry.

3. Commitment period reserve

76. Germany has not reported its commitment period reserve in the 2008 submission. In response to questions raised by the ERT during the review, Germany reported that its commitment period reserve has not changed since the review of its initial report (4,381,287,024 t CO_2 eq). The ERT recommends that the Party include information on its commitment period reserve in its next annual submission.

VIII. Conclusions and recommendations

77. Germany submitted its CRF on 15 April 2008 in accordance with the deadline established by the UNFCCC reporting guidelines, and submitted its NIR on 13 May 2008. The inventory, comprised of a complete set of CRF tables and NIR, is complete in terms of years, gases, sectors and geographic coverage. However, the inventory is incomplete in terms of categories, with many reported as "NE" across all sectors. The ERT welcomes the fact that Germany is examining these categories with a view to enhancing their completeness.

78. The inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, and is supported by an elaborate NIR in accordance with the UNFCCC reporting guidelines. The ERT identified a need for improvement in reporting for the agriculture and LULUCF sectors. For example, greater clarity is required in Germany's description of its N accounting in relation to the estimation of N_2O from agricultural soils, and further information is required to enable the ERT to assess the various values of N input (in chemical fertilizer, animal manure, crops and deposition), volatilization losses and other parameters that are used to estimate direct and indirect N_2O emissions. The ERT noted that Germany could use EU ETS data to ensure consistency between the GHG submissions to the EU and to the UNFCCC, and to bring synergy and efficiency to the preparation of the national GHG inventory.

79. The ERT noted, however, that several important institutional arrangements designed to underpin the national system (see paragraph 21 (a) and (c) above) remain to be completed, many of which have an impact on the procedures and mechanisms to secure key input data for annual GHG inventories. The inability to provide, in the 2008 submission, sector-specific emission estimates for agriculture in 2006 is an indication of problems associated with the national system, particularly when a new methodology needs to be considered. The ERT recommends that Germany continue the process to finalize and implement all outstanding arrangements and agreements for the national system. In addition, the national system must be able to identify the land areas necessary to support the reporting of emissions and removals for the LULUCF sector and for the activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

80. Other key recommendations to Germany include:

(a) Enhancing the transparency of reporting in the LULUCF sector;

(b) Continuing to develop the methodologies for calculating emissions from the agriculture sector, without suspending the use of existing methods, and reporting the latest year estimates consistent with previous years;

(c) Improving completeness of the uncertainty analyses, by providing uncertainty estimates for all categories and including a trend analysis;

(d) Improving completeness of the inventory and avoiding possible underestimations of emissions, by providing emission and removal estimates for the categories reported as "NE" if methods are available.

IX. Questions of implementation

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

Annex

Documents and information used during the review

A. Reference documents

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

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

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

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

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

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

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

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

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2007. Available at <http://unfccc.int/resource/webdocs/sai/2007.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2008. Available at <http://unfccc.int/resource/webdocs/sai/2008.pdf>.

FCCC/ARR/2006/DEU. Report of the individual review of the greenhouse gas inventory of Germany submitted in 2006. Available at <http://unfccc.int/resource/docs/2008/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>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Dirk Günther (Federal Environment Agency), including additional material on the methodology and assumptions used. The following documents were also provided by Germany:

Weiss, M., Neelis, M. and M. Patel. 2006. *Estimating CO_2 Emissions from the Non- Energy Use of Fossil Fuels in Germany. Final Report, 15 November 2006.* Federal Environmental Agency (Umweltbundesamt – UBA), Dessau, Germany.

Dämmgen, U., Haenel, D., Lüttich, M., Döhler, H., Eurich-Menden, B., Osterburg, B. 2007. *Berechnungen der Emissionen aus der deutschen Landwirtschaft – Nationaler Emissionsbericht (NIR) 2007 für 2005, Sonderheft 304 (Band 1): Einführung, Methoden und Daten (GAS-EM); Sonderheft 304 A (Band 2): Tabellen*. Landbauforschung Völkenrode, Bundesforschungsanstalt für Landwirtschaft (FAL).

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