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**Report of the individual review of the annual submission of
Germany submitted in 2012***

* In the symbol for this document, 2012 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction and summary	1–5	3
II. Technical assessment of the annual submission.....	6–125	9
A. Overview	6–29	9
B. Energy.....	30–50	13
C. Industrial processes and solvent and other product use	51–75	17
D. Agriculture.....	76–86	23
E. Land use, land-use change and forestry.....	87–97	25
F. Waste	98–109	28
G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol.....	110–125	31
III. Conclusions and recommendations	126–138	34
A. Conclusions	126–137	34
B. Recommendations.....	138	36
IV. Questions of implementation	139	39
 Annexes		
I. Documents and information used during the review.....		40
II. Acronyms and abbreviations.....		42

I. Introduction and summary

1. This report covers the centralized review of the 2012 annual submission of Germany, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 3 to 8 September 2012 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Mario Contaldi (Italy); energy – Mr. Jongikhaya Witi (South Africa), Mr. Kaleem Anwar Mir (Pakistan) and Mr. Graham Anderson (Australia); industrial processes – Ms. Siriluk Chiarakorn (Thailand), Mr. Samir Elsayed Tantawi (Egypt) and Mr. Eilev Gjerald (Norway); agriculture – Ms. Olga Gavrilova (Estonia) and Mr. Amnat Chidthaisong (Thailand); land use, land-use change and forestry (LULUCF) – Mr. Lucio Santos (Colombia) and Mr. Nalin Srivastava (India); and waste – Ms. Hlobsile Sikhosana (Swaziland) and Ms. Masako White (Japan). Mr. Witi and Mr. Contaldi were the lead reviewers. The review was coordinated by Mr. Stylianos Pesmajoglou (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.

3. In 2010, the main greenhouse gas (GHG) in Germany was carbon dioxide (CO₂), accounting for 87.4 per cent of total GHG emissions¹ expressed in CO₂ eq, followed by nitrous oxide (N₂O) (5.8 per cent) and methane (CH₄) (5.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.6 per cent of the overall GHG emissions in the country. The energy sector accounted for 83.5 per cent of total GHG emissions, followed by the industrial processes sector (7.7 per cent), the agriculture sector (7.2 per cent), the waste sector (1.3 per cent) and the solvent and other product use sector (0.2 per cent). Total GHG emissions amounted to 936,543.82 Gg CO₂ eq and decreased by 24.8 per cent between the base year² and 2010.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO₂, CH₄ and N₂O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Tables 3–5 provide information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

¹ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

² “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only.

Table 1
Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2010^a

		<i>Gg CO₂eq</i>								<i>Change</i>	
		<i>Greenhouse gas</i>	<i>Base year^a</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>Base year–2010 (%)</i>
Annex A sources		CO ₂	1 042 160.61	1 042 160.61	931 040.47	891 624.32	865 958.77	846 525.52	784 297.41	818 962.32	–21.4
		CH ₄	107 099.75	107 099.75	91 219.72	73 440.10	55 585.72	50 642.73	48 548.01	47 696.21	–55.5
		N ₂ O	85 016.32	85 016.32	79 710.72	61 844.14	61 296.87	63 506.28	63 409.72	54 730.15	–35.6
		HFCs	6 912.07	4 592.29	6 912.07	7 040.15	10 252.45	11 656.86	12 128.22	11 597.09	67.8
		PFCs	1 772.57	2 627.47	1 772.57	781.39	708.51	521.40	359.44	308.54	–88.3
		SF ₆	6 779.16	4 641.63	6 779.16	4 268.98	3 474.57	3 114.17	3 059.41	3 249.50	–30.0
KP-LULUCF	Article 3.3 ^b	CO ₂						–5 106.19	–5 793.29	–5 826.04	
		CH ₄						IE, NO	IE, NO	IE, NO	
		N ₂ O						1.94	1.95	1.78	
	Article 3.4 ^c	CO ₂	NA					–19 498.03	–19 478.54	–19 479.24	NA
		CH ₄	NA					3.28	4.62	3.20	NA
		N ₂ O	NA					65.79	66.08	65.74	NA

Abbreviations: IE = included elsewhere, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

^b Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

^c Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 2

Greenhouse gas emissions by sector and activity, base year^a to 2010

Sector	Gg CO ₂ eq								Change	
	Base year ^a	1990	1995	2000	2005	2008	2009	2010	Base year– 2010 (%)	
Annex A	Energy	1 020 759.27	1 020 759.27	903 824.29	857 935.35	827 035.30	807 420.75	753 379.06	782 312.91	–23.4
	Industrial processes	98 120.14	94 517.72	97 031.83	77 150.91	80 672.90	82 014.62	75 052.44	72 568.97	–26.0
	Solvent and other product use	4 538.56	4 538.56	3 614.92	2 971.21	2 113.56	1 874.24	1 687.92	1 944.49	–57.2
	Agriculture	83 211.01	83 211.01	73 143.42	73 860.87	69 852.84	70 466.98	68 658.73	67 478.54	–18.9
	Waste	43 111.50	43 111.50	39 820.25	27 080.73	17 602.31	14 190.39	13 024.08	12 238.91	–71.6
LULUCF	NA	–27 699.24	–27 202.75	–26 526.04	15 797.82	16 285.50	17 221.43	17 282.87	NA	
Total (with LULUCF)	NA	1 218 438.83	1 090 231.96	1 012 473.04	1 013 074.72	992 252.47	929 023.65	953 826.68	NA	
Total (without LULUCF)	1 249 740.49	1 246 138.07	1 117 434.71	1 038 999.08	997 276.90	975 966.97	911 802.23	936 543.82	–24.8	
Other ^b	NA	NA	NA	NA	NA	NA	NA	NA	NA	
KP-LULUCF	Article 3.3 ^c	Afforestation and reforestation					–5 567.85	–5 897.21	–5 944.56	
		Deforestation					463.60	105.86	120.30	
		Total (3.3)					–5 104.25	–5 791.35	–5 824.26	
	Article 3.4 ^d	Forest management					–19 428.97	–19 407.84	–19 410.31	
		Cropland management	NA				NA	NA	NA	NA
		Grazing land management	NA				NA	NA	NA	NA
		Revegetation	NA				NA	NA	NA	NA
Total (3.4)	NA					–19 428.97	–19 407.84	–19 410.31	NA	

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

^b Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

^c Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

^d Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 3
Information to be included in the compilation and accounting database in t CO₂ eq for the year 2010, including the commitment period reserve

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	4 381 287 024			4 381 287 024
Annex A emissions for current inventory year				
CO ₂	818 962 315			818 962 315
CH ₄	47 696 215			47 696 215
N ₂ O	54 730 152			54 730 152
HFCs	11 597 091			11 597 091
PFCs	308 541			308 541
SF ₆	3 249 502			3 249 502
Total Annex A sources	936 543 817			936 543 817
Activities under Article 3, paragraph 3, for current inventory year				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	-5 944 555			-5 944 555
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported		NO		NO
3.3 Deforestation for current year of commitment period as reported	120 295			120 295
Activities under Article 3, paragraph 4, for current inventory year^c				
3.4 Forest management for current year of commitment period	-19 410 305			-19 410 305
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviation: NO = not occurring.

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

^b “Final” includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 4
Information to be included in the compilation and accounting database in t CO₂ eq for the year 2009

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2009				
CO ₂	784 297 411			784 297 411
CH ₄	48 548 009			48 548 009
N ₂ O	63 409 722			63 409 722
HFCs	12 128 225			12 128 225
PFCs	359 445			359 445
SF ₆	3 059 415			3 059 415
Total Annex A sources	911 802 225			911 802 225
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009 as reported	-5 897 210			-5 897 210
3.3 Afforestation and reforestation on harvested land for 2009 as reported		NO		NO
3.3 Deforestation for 2009 as reported	105 864			105 864
Activities under Article 3, paragraph 4, for 2009^c				
3.4 Forest management for 2009	-19 407 839			-19 407 839
3.4 Cropland management for 2009				
3.4 Cropland management for base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for base year				
3.4 Revegetation for 2009				
3.4 Revegetation in base year				

Abbreviation: NO = not occurring.

^a “Adjustment” is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b “Final” includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 5
**Information to be included in the compilation and accounting database in t CO₂ eq for
the year 2008**

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2008				
CO ₂	846 525 520			846 525 520
CH ₄	50 642 730			50 642 730
N ₂ O	63 506 283			63 506 283
HFCs	11 656 859			11 656 859
PFCs	521 404			521 404
SF ₆	3 114 174			3 114 174
Total Annex A sources	975 966 970			975 966 970
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008 as reported	-5 567 851			-5 567 851
3.3 Afforestation and reforestation on harvested land for 2008 as reported		NO		NO
3.3 Deforestation for 2008 as reported	463 600			463 600
Activities under Article 3, paragraph 4, for 2008^c				
3.4 Forest management for 2008	-19 428 968			-19 428 968
3.4 Cropland management for 2008				
3.4 Cropland management for base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for base year				
3.4 Revegetation for 2008				
3.4 Revegetation in base year				

Abbreviation: NO= not occurring.

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

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2012 annual inventory submission was submitted on 13 April 2012; it contains a complete set of common reporting format (CRF) tables for the period 1990–2010 and a national inventory report (NIR). Germany also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 13 April 2012. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Where necessary, the expert review team (ERT) also used the 2011 and 2010 annual submissions during the review. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.³

8. During the review, Germany provided the ERT with additional information. The documents concerned are part of the annual submission. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

9. The inventory covers all mandatory⁴ source and sink categories for the period 1990–2010 and is complete in terms of years and geographical coverage. Germany reports various country-specific categories. The ERT commends the Party for its efforts to ensure the completeness of the inventory.

2. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Overview

10. The ERT concluded that the national system continued to perform its required functions.

³ The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), and 6(c) and (k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

⁴ Mandatory source and sink categories under the Kyoto Protocol are all source and sink categories for which the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* provide methodologies and/or emission factors to estimate GHG emissions.

11. The Party described the changes of the national system since the previous annual submission and these changes are discussed in paragraphs 12, 13 and 24 below.

Inventory planning

12. The NIR described the national system for the preparation of the inventory. The Federal Environment Agency (UBA), under the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, has overall responsibility for the national inventory. Other German ministries, including the Federal Ministry of the Interior, the Federal Ministry of Defence, the Federal Ministry of Finance, the Federal Ministry of Economics and Technology, the Federal Ministry of Transport, Building and Urban Development and the Federal Ministry for Food, Agriculture and Consumer Protection (BMELV), are also part of the national system.

13. In response to recommendations in previous review reports, the institutional framework for LULUCF and KP-LULUCF reporting has been modified: an agreement has been established with BMELV (2012) for the preparation of GHG emission data and carbon inventories for agriculture and LULUCF, and a quality management system has been established within the Johann Heinrich von Thünen Institute (vTI). The ERT welcomes these improvements to the national system.

Inventory preparation

Key categories

14. Germany has reported a tier 1 key category analysis, both level and trend assessment, as part of its 2012 annual submission. The key category analysis performed by the Party and that performed by the secretariat⁵ produced different results owing to the different levels of disaggregation being used by Germany. 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).

15. Germany has also conducted a tier 2 key category analysis for 2009 and the Party plans to repeat this analysis every three years. In response to a recommendation in the previous review report, Germany carried out for the first time a key category assessment by applying qualitative criteria. This qualitative assessment has not identified any additional key categories in Germany. In response to a question raised by the ERT during the review, the Party explained that it used the results of the key category analysis to prioritize the development and improvement of the inventory. The ERT commends Germany for its efforts to improve the quality of the inventory.

16. Germany has identified as key categories CO₂ emissions from afforestation and reforestation under Article 3, paragraph 3, of the Kyoto Protocol and forest management

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 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 or period. Where 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.

under Article 3, paragraph 4, of the Kyoto Protocol for 2010. The result of the analysis is presented in both the KP-LULUCF CRF table NIR-3 and the NIR.

Uncertainties

17. Germany has performed a tier 1 uncertainty analysis as part of its 2012 annual submission. The uncertainty analysis is consistent with the IPCC good practice guidance and the method and results are explained in the NIR. For the level analysis, the overall uncertainty of the national emissions with LULUCF is 5.9 per cent for the year 2010 and 6.3 per cent for the trend. Germany did not calculate the overall uncertainty of total national emissions, excluding LULUCF.

18. The ERT noted that the uncertainty is slightly lower than that in the previous year's annual submission (6.6 per cent for the level and 7.1 per cent for the trend). The highest uncertainties are identified in the following categories: agricultural soils – indirect emissions; agricultural soils – direct soil emissions (N₂O); forest land; wetlands (CO₂); energy industries – public electricity and heat production; transport – railways; and other sectors – residential (CO₂).

19. A tier 2 analysis is performed every three years and the most recent analysis was reported in the 2010 annual submission. A new tier 2 analysis is planned for the next annual submission.

Recalculations and time-series consistency

20. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. Germany reported recalculations for the time series 1990–2010 in the energy, industrial processes, agriculture and LULUCF sectors to take into account methodological adjustments and new activity data (AD). The recalculations led to significant changes in the estimated emissions from the industrial processes sector (especially for iron and steel production) (see para. 52(a) below), the agriculture sector (owing to revised AD) (see para. 77(b) below) and the LULUCF sector (owing to a new land-use change matrix and new emission factors (EFs)) (see para. 88 below). The major changes and the magnitude of the impact include the following: a decrease in estimated total GHG emissions for the base year (0.1 per cent) and a decrease for 2009 (0.9 per cent). The rationale for these recalculations is provided in the NIR and in CRF table 8(b).

Verification and quality assurance/quality control approaches

21. UBA has overall responsibility for the quality assurance/quality control (QA/QC) procedures and it has an in-house directive on the quality assurance of emissions reporting describing the QA/QC requirements, which are based on the IPCC good practice guidance. UBA has designed and implemented a QA/QC plan in accordance with decision 19/CMP.1. In 2011, a quality management system was established within vTI, in response to recommendations in previous review reports. This system provides the necessary framework for implementing IPCC good practice guidance and for routine QA of the German GHG inventory. It also includes a provision for the continual improvement of the inventory and a description of the responsibilities and quality objectives relative to the selection of methods, data collection, the calculation of emission estimates and relevant uncertainties and the recording of completed quality checks and their results.

22. In response to questions raised during a previous review and by the ERT during the 2012 review regarding the data collected under the European Union emissions trading scheme (EU ETS) for the verification of emission data in the energy and industrial processes sectors, Germany informed the ERT that UBA, which is also the emissions trading authority in the country, has started a research project with the aim of comparing

the plant-specific EU ETS data with the data and methods used for the preparation of category-specific annual inventories. The project is ongoing; its first results were presented in an international seminar held in Berlin in September 2011 and it is expected to be finalized by the end of 2012. The ERT commends Germany for conducting this research project and encourages Germany to report the improvements that will be considered in response to this research study in the next annual submission.

Transparency

23. The NIR submitted by Germany is generally transparent and the ERT noted some improvements in the transparency compared with the previous annual submission (e.g. better descriptions were provided for the energy, agriculture and LULUCF sectors). However, the ERT concluded that there is still room for improvement, particularly with regard to the justification of the country-specific EFs and assumptions used and the explanation of the fluctuations in AD and parameters (e.g. in the energy and LULUCF sectors) (see paras. 39 and 92 below). The ERT also noted that confidentiality issues in relation to the reported data (in the industrial processes sector) further decrease the transparency of the reporting.

24. The ERT strongly reiterates the recommendation in the previous review report that Germany improve, in its next annual submission, the transparency of its reporting by providing more detail on the methods and EFs used, so that reviewers can fully assess the underlying assumptions and rationale for choices of data, methods and other inventory parameters, together with disaggregated information at the primary fuel level in the energy sector (reference approach).

Inventory management

25. Germany has a centralized archiving system within the UBA quality system on GHG inventories, which includes the archiving of disaggregated EFs and AD (used in the Central System of Emissions database), and documentation on how these EFs and AD have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

3. Follow-up to previous reviews

26. The ERT commends Germany for the improvements undertaken in response to recommendations in the previous review reports, including: strengthening the implementation of the QA/QC procedures in institutions outside UBA which participate in the inventory preparation; estimating the potential emissions of HFCs, PFCs and SF₆ using the methodology from the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines); clarifying the current arrangements among agencies and organizations involved in the collection of the land-use data to ensure the consistency and the timeliness of the data and the responsibility of the single national entity, UBA, with reference to LULUCF estimates; and establishing a consistent land-use matrix (LUM) with the entire reworking of the reporting scheme for LULUCF and KP-LULUCF.

27. The ERT noted that most of the recommendations resulting from the review of the 2011 annual submission have not been addressed, owing to the late finalization of the

relevant review report,⁶ published in May 2012. The ERT recommends that Germany fully implement those recommendations in its next annual submission.⁷

4. Areas for further improvement identified by the expert review team

28. During the review, the ERT identified a number of areas for improvement. These are listed in table 6 below.

29. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report and in table 6 below.

B. Energy

1. Sector overview

30. The energy sector is the main sector in the GHG inventory of Germany. In 2010, emissions from the energy sector contributed 782,312.91 CO₂ eq or 83.5 per cent of total GHG emissions. Since 1990, emissions have decreased by 23.4 per cent. There are several drivers for the fall in emissions, the key ones being the changes in the national fuel mix and the long-term shift in fuel use. The shift in fuel use occurred particularly in electricity generation, which moved from coal to natural gas. Electricity generation also drew on an increased share of zero-emission energy sources, namely nuclear and, more recently, renewable generation. Increased plant efficiencies also contributed to reduced energy use, as did the recent economic crisis. These factors had a significant effect on emissions from the end of 2008 (emissions from the energy sector decreased 32.2 per cent between 2008 and 2010). Energy-related emissions have continuously decreased over time, notwithstanding the bounce-back in energy use and emissions that occurred as a result of the partial economic recovery that occurred in 2010.

31. Within the energy sector, 45.3 per cent of the emissions were from energy industries, followed by 19.8 per cent from transport, 18.7 per cent from other sectors and 14.7 per cent from manufacturing industries and construction. Fugitive emissions from fuels accounted for 1.4 per cent of energy sector emissions and the remaining 0.2 per cent were from other (energy). The NIR provides more descriptions of emission trends at the category level.

32. Germany has made recalculations for the energy sector between the 2011 and 2012 annual submissions, owing mainly to the routine transition from the preliminary AD used for the 2011 annual submission. The impact of these recalculations is a decrease of 6,747.30 Gg CO₂ eq (0.9 per cent) in the estimated energy sector emissions for 2009. The main recalculations were conducted in the following categories:

(a) Fuel combustion – solid fuels: recalculated emissions using the sectoral approach were lower by 4,873.29 Gg CO₂ (or 1.6 per cent), and the recalculated emission estimates using the reference approach were 3,864.55 Gg CO₂ (or 1.4 per cent) lower;

(b) Energy industries – solid fuel combustion: recalculated emissions were 1,803.42 Gg CO₂ eq (0.7 per cent) lower;

⁶ FCCC/ARR/2011/DEU.

⁷ Germany informed the ERT that the recommendations in previous review reports reiterated in paragraphs 41, 45, 46, 48, 71, 82 and 85 were not implemented in the 2012 annual submission owing to the late availability of the 2011 annual review report, and that all such recommendations are addressed in the 2013 annual submission.

(c) Manufacturing industries and construction: a 2,449.29 Gg CO₂ eq (6.7 per cent) decrease in the recalculated emissions of CO₂ from solid fuels but a 3,577.69 Gg CO₂ eq (8.1 per cent) increase in the recalculated emissions of CO₂ eq from gaseous fuels.

33. There are two parts to the rationale for the recalculations outlined in the NIR. Firstly, the recalculations make use of updated, revised or corrected statistical data. There were minor recalculations to account for a correction of kerosene sales and for revised quantities of combusted lubricants and the corresponding change in emissions from international air transport. There was also a revision of AD for waste incineration for energy (under the categories energy industries and manufacturing industries and construction). Secondly, there has been a transition in the AD from the early release evaluation tables and the provisional 2009 energy balance to the revised 2009 energy balance. The impacts of these and other recalculations on the overall inventory are described in some detail in the NIR. The ERT encourages Germany to continue improving the transparency of the inventory in its next annual submission.

34. The ERT noted that Germany has recognized the usefulness of using EU ETS data for the verification of emission estimates for specific categories and that a formalized procedure has been adopted for the regular use of EU ETS data (NIR, p. 86). Notwithstanding this and the efforts made to include comparisons between data sets such as the EU ETS and the International Energy Agency (IEA), comparisons are compromised by the time lag in the national energy balance. The ERT noted that the Party's 2012 NIR, which is formally about activity and emissions in 2010, includes analyses of preliminary 2010 data and comparisons (such as NIR table 23) which only extend to 2009, because IEA data for 2010 were not available at the time the comparisons were made.

35. The ERT encourages Germany to include primary fuel-type detail in the time-series analysis and noted that EU ETS data on primary fuel-type may be of use in this context. The ERT reiterates the encouragement of previous ERTs that the Party make more use of EU ETS data to verify country-specific EFs and/or emission estimates, and analyse significant differences between the two data sources. The ERT noted that the NIR summary of planned improvements includes ongoing arrangements to compare AD with EU ETS data.

36. The national energy balance prepared by the Working Group for Energy Balances (AGEB) is the basis of both the sectoral and the reference approaches. During the review, the ERT identified discrepancies between final energy use as reported in the sectoral and reference approaches, where significant differences exist between reported energy in the sectoral and reference approach for each primary fuel type (see paras. 38–41 below). The ERT reiterates the concerns of previous ERTs in relation to the timeliness of reporting and differences between the preliminary and subsequent national energy balances.

37. Consistent with previous review reports, the ERT considers that the energy sector reporting is complete in terms of categories, gases, years and geographical coverage.

2. Reference and sectoral approaches

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

38. The aggregate level of CO₂ emissions from fuel combustion estimated using the reference approach is only 0.6 per cent lower than the level estimated using the sectoral approach. However, at the primary fuel-type level the comparison reveals much larger differences, as shown in CRF table 1.A(c). These disparities in emissions exist for all years since 1990. For many inventory years the difference between the level of CO₂ emissions from the reference and sectoral approaches for solid fuels has been approximately –7 per cent. For liquid fuels the difference has been consistently close to 10 per cent. According to

the NIR, a significant proportion of oil is involved in non-energy-related use of fuels (about 20 per cent in 2007 was used as feedstock for production processes). However, in its comparison of the sectoral and reference approaches, the NIR does not include details of the differences at the primary fuel level. The ERT recommends that Germany include a detailed analysis of emission discrepancies at the primary solid, liquid and gaseous fuel levels in the next annual submission.

39. With respect to energy consumption, the aggregate level of energy consumption estimated using the reference approach is 2.8 per cent lower than the level estimated using the sectoral approach. However, a comparison at the primary fuel-type level reveals other differences. The difference in energy consumption between the reference and sectoral approach for liquid fuel AD is -2.4 per cent, while the difference for solid fuel AD is 2.4 per cent. For liquid fuels, in particular, these disparities exist for all years since 1990. As discussed with the Party during the review week, the percentage discrepancies between the sectoral and reference approaches at the fuel-type level are of the same magnitude for emitted CO₂ and AD (at least for liquid and solid fuels), but have the opposite signs (i.e. +/-2.4 per cent). Germany agreed that this issue needs to be investigated further and explained in greater detail in future annual submissions. The ERT recommends that the Party outline a more detailed elaboration of its reference approach, including the AD used, and provide a detailed comparison of the differences in the resulting emissions by each primary fuel in its next annual submission.

40. Germany included in its NIR a time-series comparison of aggregate CO₂ emissions with other independent national and international data sets (NIR tables 23 and 24 and figures 22 and 23). While the comparisons confirm the consistent emission trends and annual emission levels in all calculation approaches, the ERT noted that a fuel-level comparison between the data sets would provide useful information on the discrepancies between the reference and sectoral approaches. The ERT commends Germany for its efforts to reconcile the differences between the approaches and encourages the Party to include qualitative and quantitative information on any significant differences, at the level of primary fuel consumption, in the CRF documentation box and in the NIR of its next annual submission.

41. The ERT understands, on the basis of the NIR and responses to questions raised during the review, that the differences between the national energy balance and international reporting to IEA are subject to ongoing discussions between UBA and AGEB, and that, in general, inconsistencies occur due to different state jurisdiction data sets. In response to questions raised by the ERT during the review, Germany informed the ERT of the agreement between AGEB and UBA to address these differences within the national action plan and report on this in the next NIR. The ERT recommends that the Party make comparisons with IEA data at the primary fuel-type level, and reiterates the recommendation in the previous review report that Germany explain the reasons for differences between its inventory data and the corresponding IEA data in the next annual submission.

42. NIR section 3.2.1.2.1 includes an appropriate comparison with the IEA emission calculations. The text notes that annual deviations between the sectoral approach of IEA and the national, detailed method vary throughout the time series from -2.8 to 2.9 per cent. The NIR also states that the "average deviation for (currently) 20 years is 0.4 per cent". The ERT noted that, in statistics, the average deviation is based on the absolute rather than the real values of individual deviation figures, because the average of a set of numbers with a similar range of values above and below zero will be close to zero. The ERT encourages Germany to modify the way it calculates the average deviation, in order to conform with statistical convention, for its next annual submission.

International bunker fuels

43. In relation to international civil air transport, the 2012 NIR includes details of the methodology for differentiation between national and international activity. Germany uses data from Eurocontrol (the European Organisation for the Safety of Air Navigation) to disaggregate international and civil aviation AD. As mentioned in paragraph 33 above, the Party has made recalculations in these categories because the split of total kerosene consumption between domestic and international flights was revised. The ERT commends the Party for providing this level of transparency and clarity.

44. With respect to emissions from international maritime transport/maritime navigation, the AD for bunker fuels are taken from the national energy balance. The NIR includes thoroughly detailed information on the methodological issues for international sea transport, except in relation to international transport on inland waterways (see para. 50 below).

Feedstocks and non-energy use of fuels

45. The NIR states that to determine whether an activity listed in the national energy balance as “non-energy use” is reported as the relevant feedstock quantities, the fossil-fuel-related carbon stored in relevant products is assessed. Even so, differences between the carbon quantities reported and the relevant emissions are explained as being due to different carbon content factors. While NIR table 312 allows comparison of discrepancy between the carbon quantities reported in line 43 and the relevant emissions, the ERT considers that the NIR section on CO₂ emissions from non-energy-related use of fuels could be more transparent in relation to its explanation of the difference in the amount of the carbon stored in products compared with the carbon in non-energy-related fuel consumption. Therefore, the ERT reiterates the recommendation in previous review reports that Germany provide justification for the carbon storage fractions used in its next annual submission.

46. As noted in recommendations in previous review reports, additional information for feedstocks and non-energy use of fuels in CRF table 1.A(d) is missing for all years. The ERT considers that inclusion of this information would increase the transparency of the reporting and facilitate understanding of the overall energy balance. The ERT reiterates the recommendation in previous review reports that Germany include this additional information in CRF table 1.A(d) in its next annual submission.

3. Key categoriesStationary combustion: solid fuels – CO₂

47. The solid fuel category for petroleum refining comprises coal as well as derived fuels such as coke oven gas, each of which have very different carbon contents. The ERT has identified that the overall trend in the CO₂ implied emission factor (IEF) has decreased between 1990 and 2010. The 2010 IEF for this category (40.00 t/TJ) is 57.0 per cent lower than the 1990 value (93.09 t/TJ) and is the lowest reported by Parties (range of 40.00–261.00 t/TJ). The CO₂ IEF has been constant at 40.00 t/TJ since 1997. Following questions raised by previous ERTs, Germany has provided an explanation that this trend can be explained by the use of coke oven gas. The ERT recommends that Germany provide a brief explanation of this issue in its next annual submission.

Stationary combustion: biomass – CH₄ and N₂O

48. The ERT has identified that the overall trend in the CH₄ IEF increased significantly between 1990 (9.79 kg/TJ) and 2010 (148.50 kg/TJ), an increase of 1,416.2 per cent. The CH₄ IEF in 2010 is among the highest of all Parties (ranging from 1.00 kg/TJ to

483.99 kg/TJ). The NIR (p. 130) mentions that “more and more” solid biomass (scrap wood and processed settlement waste) is being used for energy generation. The ERT recognizes that significant changes in fuel activity can have a significant impact on IEFs because EFs change with scale. The ERT reiterates the recommendation in the previous review report that the Party provide descriptions of the main drivers behind the changes in AD, as well as the underlying rationale for the country-specific EFs applied for each biomass fuel. Information on the increased use of biomass would contribute to understanding the changes in the AD and related combustion technologies, and would assist with explaining the overall trends in IEFs.

49. As in the previous review report, this ERT noted the overall increasing trend in the N₂O IEF for manufacture of solid fuels and other energy industries. The N₂O IEF increased from 0.90 kg/TJ in 1990 to 13.61 kg/TJ in 2010, a 1,411.7 per cent increase. In particular, the ERT noted a large inter-annual change between 2007 (2.26 kg/TJ) and 2008 (8.00 kg/TJ), a 254.1 per cent increase. In response to a request from the ERT during the review for the Party to provide information to explain the increasing trend, Germany explained that the use of sewage gas ended in 2007 and there has since been an increased co-firing of waste at a fluidized bed combustion plant, which causes high N₂O emissions. The ERT recommends that Germany provide a brief explanation of these changes in its next annual submission.

4. Non-key categories

Navigation: liquid fuels – CO₂, CH₄ and N₂O

50. Consistent with recommendations in the previous review report, the ERT noted that Germany continues to be unable to distinguish the amount of bunker fuel that is used for international transport on inland waterways (such as on the Rhine river) from that used for domestic navigation. The ERT also noted that this leads to a potential overestimation of emissions. Taking into consideration the small contribution of the category to the national totals, the ERT suggests that Germany make efforts to separate the emissions from international transport associated with inland navigation from the emissions from domestic navigation, taking into account the availability of resources.

C. Industrial processes and solvent and other product use

1. Sector overview

51. In 2010, emissions from the industrial processes sector amounted to 72,568.97 Gg CO₂ eq, or 7.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 1,944.49 Gg CO₂ eq, or 0.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 23.2 per cent in the industrial processes sector, and decreased by 57.2 per cent in the solvent and other product use sector. The key drivers for the overall fall in emissions in the industrial processes sector since 1990 are a mix of decreased production (e.g. aluminium, ferroalloys and difluoromonochloromethane (HCFC-22) production) and measures to reduce emissions (e.g. N₂O in adipic and nitric acid production, and PFCs in aluminium production). There was a fall in emissions from the industrial processes sector from 2009 to 2010 owing, primarily, to a decrease in emissions of N₂O from the production of adipic acid as a result of one producer’s installation of a second waste-gas-treatment system. In addition, emissions from the production of halocarbons fell due to the termination of HCFC-22 production in mid-2010 and the consequent closing down of the plant in 2011. The decrease in overall emissions was partly offset by an increase in emissions from iron and steel due to higher production output. Within the industrial processes sector in 2010, 27.6 per cent of the emissions were from

chemical industry, followed by 26.2 per cent from metal production, 25.6 per cent from mineral products and 19.9 per cent from consumption of halocarbons and SF₆. Production of halocarbons and SF₆ accounted for 0.4 per cent. The remaining 0.3 per cent was from other (industrial processes).

52. Germany has made recalculations for the industrial processes sector between the 2011 and 2012 annual submissions following changes in AD, in order to rectify identified errors and replace preliminary data with final production data. The impact of these recalculations on the industrial processes sector is an increase in the estimated emissions by 2.4 per cent for 2009. The main recalculations took place in the following categories:

(a) CO₂ emissions from iron and steel production – due to the updating of statistical input data for 2009 (increase by 1,794.17 Gg CO₂ (15.4 per cent));

(b) PFC emissions from aluminium production – due to an error in the 2011 annual submission, where the 2009 data were a duplicate of the 2008 emissions (decrease of 69.47 Gg CO₂ (-28.1 per cent));

(c) CO₂ emissions from soda ash use in the glass industry – due to the correction of AD, which were increased for all years from 1990 to 2009;

(d) CO₂ emissions from ferroalloys production – due to the updating of statistical input data for 2006–2009 (from increase of 1.00Gg CO₂ (11.8 per cent in 2006) to decrease of 4.22 Gg CO₂ (53.2 per cent in 2009));

(e) SF₆ emissions from semiconductor manufacture for the years 1995–1999 (from increase of 2.84 t CO₂ eq (10.5 per cent) in 1995 to decrease of 10.16 t CO₂ eq (24.1 per cent) in 1999).

53. Germany has made recalculations for the solvent and other product use sector between the 2011 and 2012 annual submissions following changes in AD. The impact of these recalculations on the solvent and other product use sector is a decrease in emissions by 8.7 per cent for 2009. The main recalculations relate to changes to the AD for 2009 for indirect CO₂ emissions from non-methane volatile organic compounds (NMVOCs). The updates to the AD for 2009 were due to the fact that preliminary foreign trade statistics for 2009 were used for the 2011 annual submission.

54. The NIR and CRF tables are complete in terms of reported gases and categories and generally transparent. However, AD were reported as not estimated (“NE”) for production of HCFC-22 because the company did not provide production data. The AD for solvents is also reported as “NE”. In response to a question raised by the ERT during the review, the Party explained that AD will be provided in the next annual submission. The ERT noted that AD and/or GHG emissions are reported as included elsewhere (“IE”) for some activities, such as limestone and dolomite use, pig iron and N₂O from aerosol cans. Generally, the Party has explained under which categories the emissions are reported, but the ERT encourages the Party to decrease the number of instances where the notation key “IE” is used in the next annual submission.

55. The methods and data used to calculate emissions, as well as category-specific information on uncertainties and QA/QC, are explained for each category in the NIR, although the details are not always transparently presented, especially because of the confidentiality of many AD. This issue has made it difficult for the ERT to review the inventory. In particular, CRF table 8(b) for 2009 does not provide explanatory information for the recalculations of PFCs from aluminium production. The ERT noted the lack of consistency in the information presented in different sections of the NIR for some recalculations (e.g. the descriptions of the recalculation for ferroalloys production in sections 4.4.2.5 and 10.1.1.2 of the NIR, for aluminium production between sections 4.4.3.5 and 10.1.1.2 of the NIR, and for ferroalloys production between sections 4.4.2.5 and

10.1.1.2 of the NIR). The ERT recommends that the Party improve the transparency of its reporting by providing information on all undertaken recalculations in CRF table 8(b) in its next annual submission and improve the consistency of the information presented in its NIR.

56. In response to the recommendation in the previous review report regarding the use of data collected under the EU ETS for the verification of emission data in the industrial processes sector, Germany started a research project in December 2010 focusing on data exchange between the EU ETS and national GHG reporting. The procedure is described in section 1.3.3.1.7 of the NIR. The ERT commends Germany for this effort. However, the results of the verifications made prior to the 2012 annual submission are not well described in the NIR. During the review, in response to a question raised by the ERT, the Party submitted the results from the verification of lime production and stated that emissions from glass production have also been verified, as described in the NIR. The ERT recommends that Germany report on the progress of this project and the implications that the project has had on the QA/QC procedures and present the results of the verification in its next annual submission.

57. The ERT noted that Germany has improved the transparency of its inventory reporting following recommendations in the previous review report (e.g. improving estimates for iron and steel production, limestone and dolomite use, and HFC emissions). Further improvement to enhance transparency is necessary and details on this issue are mentioned, where relevant, in the specific subsections below (see paras. 60, 62–66, 69 and 71 below).

58. The ERT forwarded several questions to Germany during the review week. The ERT commends the Party for its cooperation and has included the Party's information in the relevant subsections below.

2. Key categories

Cement production – CO₂

59. Germany calculates CO₂ emissions from cement production on the basis of clinker production, with a country-specific EF of 0.53 t CO₂/t clinker, which is higher than the IPCC default value (0.51 t CO₂/t clinker). Although the overall IEF is higher than the IPCC default value, the ERT noted that Germany does not apply a correction for cement kiln dust. Germany explains in the NIR that there is no need to take account of significant losses via the exhaust-gas pathway because dust separated from the exhaust gases is returned to the burning process in the German cement industry. This means that the cement kiln dust correction factor is 1.00. From the explanation given by Germany in the NIR, the ERT considers that Germany follows the IPCC tier 2 method, which is appropriate for this key category. The ERT encourages the Party to verify the emission data with data from the EU ETS and report the results of the comparison in its next annual submission.

Lime production – CO₂

60. According to the NIR, the German Lime Association collects production data for the entire time series for lime production and the NIR states that this approach ensures that all of German lime production is taken into account in the inventory. Germany has compared the CO₂ emissions from lime production with EU ETS emission data for the period 2005–2010. The ERT noted that, for three out of the six years (2006, 2007 and 2010), the CO₂ reported in the CRF tables is higher than the CO₂ emissions from lime production included in the EU ETS. The description of the category in the NIR of the 2012 annual submission suggests that not all lime production is covered by the EU ETS and, if this is the case, the emissions from lime production in the inventory should be higher than the total emissions for the category under the EU ETS. In response to a question raised by the ERT

during the review, the Party explained that the emissions will be recalculated for the next annual submission in the light of the information from the EU ETS. The ERT recommends that the Party justify and transparently describe the estimation methods used, including assumptions made, and how it ensures that the lime production AD are complete. In addition, the ERT recommends that Germany include in the NIR short summaries of the comparisons made between inventory data and other sources, such as the EU ETS data, briefly explaining the key reasons for the differences.

Ammonia production – CO₂

61. The method used by the Party for calculating CO₂ emissions from ammonia production is from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. The data included in the inventory are collected from plant operators by the agricultural industry association, Industrieverband Agrar (IVA), and are subject to QA checks by IVA.

62. It is not clearly described in the NIR in which category or categories emissions from ammonia production are reported. In response to questions raised by the ERT during the review, Germany clarified that the reported emissions in the industrial processes sector include emissions from raw materials (natural gas and heavy fuel oil) and recovered CO₂ that is used in, for example, the production of urea. The ERT recommends that the Party clearly explain this in its next annual submission. The amount of recovered CO₂ is reported as not occurring (“NO”) in the CRF tables and the ERT recommends that the Party change the notation key used to “IE”. During the review week, the Party submitted to the ERT a time series of estimates for recovered CO₂ from ammonia production. The ERT encourages the Party to improve the transparency of its reporting by including this time series under ammonia production in its next annual submission.

63. According to the NIR, emissions from energy use in ammonia production are reported under the energy sector and the amount of energy used comes from the energy balance. The ERT was not able to extract the amount of energy used for this ammonia production from the energy balance. The Party explained that, in addition to confidentiality concerns, the statistical collection process does not allow for the disaggregation of the energy use between different subcategories of chemical industries. The ERT took note of this explanation and encourages Germany to consider ways to improve the transparency of the NIR while respecting the confidentiality of the data.

64. During the review, the ERT asked Germany to explain how the carbon content of natural gas and heavy fuel oil is determined. In response to questions raised by the ERT during the review, the Party submitted data on produced ammonia, emissions of CO₂ and the amount of recovered CO₂. Given this information, the ERT concluded that the IEF seems to be reasonable. The ERT recommends that the Party include in the NIR of its next annual submission information on how the carbon content of heavy fuel oil is determined.

Adipic acid production – N₂O

65. The emissions from adipic acid production included in the inventory for 1990 until the mid-1990s are based on IPCC default EFs and the amount of adipic acid produced from the producers. Thereafter, the emission estimates reported are based upon emission data reported by the plants. Production data and IEFs are reported as confidential. In response to a request from the ERT during the review for Germany to provide additional information on the methods and frequency of measurement at these plants, Germany provided the confidential production data and the time series for the calculated IEFs based on reported total emissions and production for the category. The ERT commends the Party for sharing the data with the ERT. The three facilities producing adipic acid have installed abatement technologies. The frequency that each facility uses to estimate the reported N₂O emissions (e.g. continuous measurement, periodically or monthly) is not described in the NIR. The

ERT recommends that Germany improve the description of methodological issues for the calculation of the reported N₂O emissions (e.g. precisely for what years the IPCC default EF is used, and the methods used to calculate N₂O emissions at each plant) in its next annual submission.

Other (chemical industry) – CO₂

66. In 2010, CO₂ emissions from other (chemical industry) contributed 12.2 per cent of the total GHG emissions from the industrial processes sector. The main contributors to CO₂ emissions were: burn-off of coke as a catalyst at oil refineries; production of carbon black and methanol; and transformation processes. The methodology used to estimate emissions from coke burn-off in catalyst regeneration is not well described in the NIR. The ERT recommends that Germany include a more detailed description of methodological issues in its next annual submission, including explanations of whether the emissions are the result of fuel use for the production of energy.

67. The estimated emissions for this category have been subjected to the general QA/QC procedure that is implemented for all categories by the Party. However, the ERT noted that some of the activities in this category are covered by the EU ETS (e.g. burn-off of catalysts at oil refineries, and methanol production), so the ERT recommends that the Party verify the reported emissions using EU ETS data and report the result of the verification in its next annual submission.

Iron and steel production – CO₂

68. Germany reports CO₂ emissions from the following three components under this category: use of reducing agents; limestone use; and electrode consumption. This is not in line with the Revised 1996 IPCC Guidelines, according to which CO₂ emissions from limestone use in iron and steel production should be reported in the limestone and dolomite use category (see para. 74 below).

69. In response to questions raised by the ERT during the review, Germany provided important information regarding the difficulties of verifying the inventory data with the EU ETS data that apply to nearly all iron and steel producers that are covered by the EU ETS. The main difficulty arises from the fact that material flows are not available in the German EU ETS data. The EU ETS data are much more aggregated than the inventory data. The Party emphasized that the carbon balance submitted in the NIR underlines the conservative reporting (i.e. possible overestimation of emissions) of the inventory and explained that it plans to intensify the discussions with the iron and steel industry to improve the carbon balance. In relation to Germany's method for reporting emissions from iron and steel not being in line with the Revised 1996 IPCC Guidelines, the ERT considers that it is important (despite the problem described above) that the Party engage in a dialogue with the industry to identify ways to ensure that the reporting is consistent with the methods in the Revised 1996 IPCC Guidelines (i.e. do not account for emissions from limestone and dolomite use in this category) and that the reported emissions are as accurate and comparable as possible. The ERT strongly recommends that the Party complete this work and report the results in its next annual submission.

Aluminium production – PFCs

70. The estimates of PFC emissions from production of aluminium are based on annual reports from the industry since 1997. Measurements conducted in all German smelters in the years 1996 and 2001 form the basis for the calculation of emissions of tetrafluoromethane (CF₄). Specific CF₄ emission figures per anode effect were calculated in accordance with the technologies used. The number of anode effects is recorded and documented in the foundries. Hexafluoroethane (C₂F₆) and CF₄ occur in the calculations as

a constant ratio of about 1:10. The method was applied to the entire time series, and the emissions for the years 1990 to 1996 were filled in through extrapolation. The ERT considers this is an appropriate method that is in line with the IPCC good practice guidance.

Consumption of halocarbons and SF₆ – HFCs

71. The ERT commends Germany for, in general, having developed detailed data-collection procedures for the calculation of actual emissions of HFCs, PFCs and SF₆ and encourages the Party to continue its efforts to further improve the quality of the emission estimates. Germany has cooperated with the United Kingdom of Great Britain and Northern Ireland and Austria and the three countries have reviewed each other's fluorinated gas (F-gas) inventories. The conclusion was that Germany's inventory is of good quality and no recommendations for improvements were given. The ERT reiterates the recommendation in the previous review report that Germany provide some details from the trilateral review of the F-gas inventories, including a summary of the rationale for the conclusions, in its next annual submission.

72. During the review week, the ERT questioned the Party regarding the ratio of potential to actual emissions. The Party responded that the ratio reported in the 2012 NIR is wrong and will be corrected in the next annual submission. The ERT recommends that Germany correct the ratio in its next annual submission.

Solvent and other product use – N₂O

73. Use of N₂O for anaesthesia was identified as a key category in the trend assessment in 2010 owing to the sharp decline in the use of N₂O in Germany. In the NIR, the Party explained that, as part of its prioritization of resources, it has decided not to apply the more stringent methods to this category that are normally required for key categories. The ERT agrees with this decision.

3. Non-key categories

Limestone and dolomite use – CO₂

74. Germany continues to report CO₂ emissions from limestone and dolomite use as "IE" and the emissions are included in the categories where the limestone and dolomite are consumed (e.g. under iron and steel production or flue gas desulphurization). In response to recommendations in the previous review report, Germany has provided, in its NIR, a CO₂ balance from the use of limestone (table 95) in addition to a limestone use balance (table 94). Both balances are shown for only a few years. In addition, Germany explains in its NIR that it has verified its inventory with EU ETS data. In response to questions raised by the ERT during the review, Germany provided more information about the verification performed. The information improves, to some extent, the transparency of the inventory for this category. The ERT welcomes this improvement in transparency, which will facilitate comparability across Parties.

Solvent and other product use – CO₂

75. The ERT commends Germany for reporting indirect CO₂ emissions for this category. The ERT noted that the Party has changed the EF for converting NMVOCs to CO₂ from 75 per cent carbon in NMVOCs to 60 per cent carbon, without justifying that the recalculation reflects its national conditions. Even though this is a minor issue, the ERT considers that it is not good practice to change from one EF to a new and lower one without justifying the change. The ERT therefore encourages the Party to justify in its next NIR that the new EF better reflects the NMVOC species in Germany.

D. Agriculture

1. Sector overview

76. In 2010, emissions from the agriculture sector amounted to 67,478.54 Gg CO₂ eq, or 7.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 18.9 per cent. The key driver for the fall in emissions is a decrease in the total animal population, which has affected the level of emissions from enteric fermentation and manure management. Within the sector, 58.3 per cent of the emissions were from agricultural soils, followed by 30.1 per cent from enteric fermentation. The remaining 11.6 per cent were from manure management.

77. Germany has made recalculations for the agriculture sector between the 2011 and 2012 annual submissions in response to the 2011 annual review report and following changes in EFs. The impact of these recalculations on the agriculture sector is a decrease in the estimated emissions of 5.6 per cent for 2009. The main recalculations took place in the following categories:

(a) Enteric fermentation: revision of the CH₄ EFs for cattle and swine led to a decrease of the estimated CH₄ emissions from enteric fermentation from livestock of 467.34 Gg CO₂ eq (2.2 per cent);

(b) Agricultural soils: owing to the revised AD for the amounts of animal manure applied to agricultural soils and the areas of organic soils cultivated, estimated N₂O emissions decreased by 3,292.12 Gg CO₂ eq (7.6 per cent);

(c) Manure management: revised values of gross energy intake by livestock category resulted in a decrease in the estimated total amount of nitrogen (N) generated by livestock and poultry by about 4 per cent for 2009, compared with that reported in the 2011 annual submission.

78. The 2012 annual submission is complete for the agriculture sector. Germany does not cultivate rice and this activity, together with the prescribed burning of savannahs and the prescribed burning of agricultural residues, is reported as “NO”. The inventory report is generally transparent. The ERT welcomes the fact that Germany has included as a part of its 2012 annual submission a separate and more detailed report which describes the inventory calculations for the agriculture sector, namely “Calculations of gaseous and particulate emissions from German agriculture 1990–2010”.

2. Key categories

Enteric fermentation – CH₄

79. Germany used a tier 2 method to estimate CH₄ emissions from enteric fermentation of cattle and swine and a tier 1 method to calculate emissions for other livestock categories. Germany has made recalculations of the values of gross energy intake for cattle. The changes have also been made in the estimation of animal weights and the lactation phase of swine livestock categories. The ERT welcomes these improvements in the estimation of the emissions from enteric fermentation.

Manure management – CH₄ and N₂O⁸

80. Germany uses a tier 2 method to estimate CH₄ emissions from manure management for all livestock categories, except for geese, for which, according to the NIR, the default EF for poultry was used.

81. According to the NIR, the values of volatile solids excreted by the cattle and swine livestock categories and by poultry (except for ducks and geese) have been revised in the 2012 annual submission in accordance with a national estimation procedure.⁹ The equation used for the estimation of emissions and the parameters used in the calculations have been reported in the NIR.

82. In response to the recommendation in the previous review report to update stable type distribution of manure management systems, Germany has evaluated animal housing systems under the 2010 Agricultural Census and developed a time series for the proportions for the main categories of animal housing systems. The ERT welcomes the improvements made by the Party. However, the ERT reiterates the recommendation in the previous review report that the Party provide detailed information on the amount of treated manure used as biogas and encourages Germany to present this information in its next annual submission.

83. Germany uses a tier 2 method, which is based on national nitrogen excretion (Nex) rates for different livestock categories and poultry, country-specific manure management systems and N₂O EFs, to estimate the emissions from manure management.

84. In response to the recommendation in the previous review report to review the Nex rate for dairy cattle, which was the highest of all reporting Parties in the 2011 annual submission (131.5 kg N/head/year), Germany has recalculated the Nex values for the cattle (113.7 kg N/head/year), swine and horses livestock categories, and for poultry. The ERT welcomes the improvements, which were performed during the 2012 inventory cycle.

85. Germany uses a N₂O EF of 0.005 kg N₂O–N/kg N to estimate the N₂O emissions from solid manure systems, which is lower than that presented in the Revised 1996 IPCC Guidelines (0.02 kg N₂O–N/kg N) and is the lowest among the reporting Parties (range 0.015–0.02 kg N₂O–N/kg N). In response to a request from the ERT during the review for the Party to provide the rationale for the selected value, Germany explained that the value of the N₂O EF was determined based on measurements made at the plant level and at special test arrays in Germany and central Europe, and provided the reference to two studies in the inventory report.¹⁰ The ERT reiterates the recommendation in the previous review report that Germany, in its next annual submission, provide well-documented information on the housing systems of cattle and swine and herd size, and detailed descriptions of manure systems (e.g. to specify how often cattle and swine faeces and urine are removed from the floors of pig and cattle housing) to justify the EF used or recalculate the emissions by using the N₂O EF from the Revised 1996 IPCC Guidelines.

⁸ Not all emissions related to all gases under this category are key categories, particularly N₂O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

⁹ Daemmgen, U.; Amon, B.; Gyldenkaerne, S.; Hutchings, N.J.; Kleine Klausling, H.; Haenel, H.-D.; Roesemann, C. *Reassessment of the calculation procedure for the volatile solids excretion rates of cattle and pigs in the Austrian, Danish and German agricultural emission inventories*. Landbauforschung, 61: 115 – 126.

¹⁰ FREIBAUER, A. 2003. *Regionalised inventory of biogenic greenhouse gas emissions from European agriculture*. European Journal of Agronomy 19(2): 135-160.
KTBL. 2005: *Methodenaktualisierung für die Emissionsberechnung 2003*. F+E Vorhaben 203 412 53 des UFOPLAN 2003. Teilvorhaben 04: EF Landwirtschaft: Landwirtschaft – Ermittlung und Anpassung von Emissionsfaktoren (CRF 4). Abschlussbericht. KTBL, Darmstadt, 90 S.

Direct soil emissions – N₂O

86. Germany has recalculated the emissions due to the cultivation of N-fixing crops and from crop residues left on agricultural soils because of the revision of the AD used and in order to correct a data transfer error. The recalculations have led to a decrease in the estimated emissions by 0.3 per cent and 21.5 per cent from N-fixing cultivation and crop residues in 2009, respectively, compared with the emissions reported in the 2011 annual submission. Germany has provided the rationale for the recalculation of emissions from N-fixing cultivation in the 2012 annual submission and the rationale for the recalculation of emissions from crop residues in the comprehensive report on agriculture submitted as a supplement to the 2012 annual submission.

E. Land use, land-use change and forestry

1. Sector overview

87. In 2010, net emissions from the LULUCF sector amounted to 17,282.87 Gg CO₂ eq. In 1990, the LULUCF sector was a net sink accounting for net removals of 27,699.24 Gg CO₂ eq. Since 1990, net emissions have increased by 162.4 per cent. The key driver for the rise in emissions is the significant increase in harvest removals in recent years from the category forest land remaining forest land. Within the sector, forest land accounted for net removals of 24,991.20 Gg CO₂ eq. Net emissions from cropland were 28,457.97 Gg CO₂ eq, followed by 9,049.93 Gg CO₂ eq from grassland, 2,551.37 from settlements and 2,156.48 Gg CO₂ eq from wetlands. The remaining 58.29 Gg CO₂ eq emissions were from other (LULUCF). There were no emissions or removals reported for the category other land. LULUCF sector removals accounted for 1.8 per cent of the national GHG inventory total, whereas in 1990 the LULUCF sector was a net sink, accounting for 2.2 per cent of the national inventory total in absolute terms.

88. Germany has made recalculations for the LULUCF sector between the 2011 and 2012 annual submissions in response to recommendations made in the previous review reports. The impacts of these recalculations on the LULUCF sector are: an increase in the estimated removals from forest land of 0.7 per cent; an increase in the estimated emissions from cropland of 4.7 per cent; a decrease in the estimated emissions from grassland of 16.1 per cent; a decrease in the estimated emissions from wetlands of 3.5 per cent; and an increase in the estimated emissions from settlements of 13.9 per cent. The result was an overall decrease in the estimated LULUCF sector emissions for the year 2009 by 2.0 per cent. The recalculations were due to:

- (a) The use of a new LUM for the entire time series as a result of a change in the transition period from one to 20 years;
- (b) The use of new EFs for mineral soils and litter pools for all land-use categories from the expanded Forest Soil Inventory II (BZE¹¹ II)/ BioSoil database;
- (c) The correction of an erroneous value for the EF for N₂O–N (0.600 kg/ha) for drainage of organic soils.

89. Although the NIR provides some information on recalculations, the ERT considers that it lacks transparency on some key elements. In particular, there is lack of transparent information on the reallocation of areas among different land-use categories and the change in IEFs following the adoption of the new land-use change matrix based on a 20-year transition period. The ERT recommends that Germany provide detailed and transparent information on how areas under different land-use categories have been reallocated as a

¹¹ Bodenzustandserhebung im Wald.

result of the change in transition period, and the impact on the IEFs for different land-use categories, in its next annual submission.

90. The inventory is generally complete in terms of categories, pools and gases. However, Germany has reported many carbon pools (e.g. dead organic matter for land converted to settlements and land converted to wetlands) as “NO”. The ERT noted that, although it is not mandatory to report these because the IPCC good practice guidance for LULUCF does not provide methods for them, they should instead be reported as “NE”, as it is unlikely that there will not be any loss of dead organic matter in these conversions. In response to a question raised by the ERT during the review, Germany clarified that this has been done because dead organic matter only occurs on forest land and not in the other land-use categories. The Party also explained that the biomass estimates for woody grassland and wood in wetlands and settlements include the whole plant, including leaves and roots, so that an extra dead organic matter pool could lead to double counting. However, the ERT noted that the estimation methodology provided in the IPCC good practice guidance for LULUCF involves estimating the changes in different carbon pools as a result of land-use management and conversion and not the absolute level of carbon stocks. The ERT further noted that, in the case of woody grasslands and wood in wetlands and settlements, if the dead organic matter pool is included in the living biomass pool, the changes in those pools could alternatively be reported as “IE” instead of “NO”. The ERT therefore recommends that the Party examine all cases where changes in pools for different land uses have been reported as “NO” and report them using other appropriate notation keys as necessary in the next annual submission.

91. For agricultural lime application in the category cropland, Germany has assumed that the uncertainties of liming EFs are zero, as these are determined stoichiometrically. However, the ERT has determined that this is not true because there are other sources (e.g. impurities) that could potentially cause uncertainty in the EFs. Similarly, AD for liming application to agricultural soils has been assumed to have zero uncertainty as it is based on an exhaustive statistical survey mandated by law. In response to a question raised by the ERT during the review, Germany provided additional information from the Federal Statistical Office clarifying that impurities are allowed within the boundaries defined by the Fertilizer Act (Düngemittelverordnung), which allows impurities between 2 per cent and 4 per cent, depending on the lime type. Based on weighting by the lime type, the uncertainty of the liming EF was thus estimated at 2.9 per cent. The ERT recommends that the Party revise the uncertainty assessment including this information in its next annual submission.

92. Germany has used the results from various forest inventories and soil surveys conducted in different years to estimate the carbon stock values in different pools in many land-use categories. For example, forest biomass data have been derived using the national forest inventories conducted in 1987 (BWI¹² I) and in 2002 (BWI II), and the 2008 Inventory Study. For litter and mineral soils, the national forest soil inventories (BZE I and BZE II/ BioSoil) of 1990 and 2006 were used. The data for the other years in the time series have been derived using interpolation and extrapolation. However, the ERT noted that these forest inventories were conducted at different times with differing approaches and coverage. For example, for BWI I the tree biomass was measured only for the West German Länder (pre-unification), while for BWI II all West and East German Länder (post-unification) were considered. The use of different data sources for different years in the inventory time series has resulted in sharp step-changes in the stocks of carbon pools in some years for many land-use categories, such as forest land, cropland, grassland and settlements. In particular, changes are observed between the years 2000–2001, 2001–2002, 2005–2006 and 2008–2009. The NIR provides some explanations for this issue for forest

¹² Bundeswaldinventur.

land, but information is not provided for the other land-use categories. In response to questions raised by the ERT during the review, the Party provided additional information that cites increased land conversions and biomass removals as the main reasons for the observed changes. Although some changes could be expected across the time series due to such trends, such steep changes in the years that coincide with the years of these surveys in most cases lead the ERT to believe that these spikes are attributable to the use of information from different surveys in these years without making suitable adjustments to ensure time-series consistency. Specific recommendations on this issue are provided in the section on key categories below.

93. Germany has provided information on QA/QC in the NIR. The NIR refers to tier 1 and tier 2 QA/QC procedures being implemented for the LULUCF sector in accordance with the provisions of the Quality System for Emissions Inventories manual and associated documents. However, aside from the comparison of IEFs with those of other European countries, the NIR lacks transparent information on category-specific QC checks for different land-use categories. For example, category-specific QC checks could involve specific measures to ensure reasonableness, consistency and completeness of AD, EFs and other parameters used for specific land-use categories. The ERT recommends that Germany provide more detailed transparent information on the category-specific QC checks performed for all categories in the LULUCF sector in its next annual submission.

2. Key categories

Forest land remaining forest land – CO₂

94. Removals from forest land remaining forest land have undergone a sharp reduction of 71.1 per cent between 2001 (–66,858.35 Gg) and 2002 (–19,325.65 Gg) in terms of net CO₂ removals. The main reason for this sharp reduction is the steep fall in carbon stocks in the living biomass pool, with a 74.5 per cent drop in the CO₂ IEF for living biomass carbon stock changes. The NIR provides some explanation on this issue, citing increased removals in the years after 2002 and the changing age class structure of the forests as the main reasons. However, while some changes could be expected across the time series due to such trends, the ERT considers that they generally take place gradually over a number of years. It is rather unlikely that such drastic changes would take place across a single year with the values remaining fairly constant before and after that year. Taking into account the discussion on the use of different studies for different years (see para. 92 above), the ERT concludes that utilizing data without any corrections for differing approaches and coverage could be a likely reason for this sudden drop in living biomass carbon stocks for forest land remaining forest land. The ERT recommends that, in order to ensure time-series consistency, Germany evaluate the inventory methodology for forest land remaining forest land with regard to the use of data from a variety of sources that differ in their coverage and methods, transparently documenting how the time-series consistency issues have been addressed in its next annual submission.

Land converted to forest land – CO₂

95. Germany estimates the carbon stock changes in the litter pool for land converted to forest land using the litter stocks available from three different national soil inventories. The Forest Soil Inventory I (BZE I) was carried out from 1987 through 1992; BioSoil was carried out from 2006 to 2007; and Forest Soil Inventory II (BZE II) was carried out between 2006 and 2008. The litter carbon stocks in the intervening years were obtained using interpolation. The annual carbon stock changes are estimated by dividing the carbon stocks in each year by 40 (i.e. the number of years it takes for the litter carbon stocks to form). This methodology is different from the default methodology for the estimation of changes in mineral soil carbon stocks provided in the IPCC good practice guidance for

LULUCF. The NIR contains insufficient description of this methodology and its consistency with the methodology provided in the IPCC good practice guidance for LULUCF. The ERT recommends that Germany transparently describe the methodology, clearly demonstrating its consistency with the methodology provided in the IPCC good practice guidance for LULUCF, in its next annual submission.

Land converted to cropland – CO₂

96. The carbon stock changes in land converted to cropland show a sharp decrease of 84.4 per cent between 2000 (–1,434.7 Mg carbon (C)) and 2001 (–1,030.2 Mg). The IEF for net changes in carbon stocks in living biomass pool also registered a dramatic reduction of 84.2 per cent in the same period (from –0.49 Mg C/ha in 2001 to –0.08 Mg C/ha in 2002). The reasons for this decline have not been explained clearly in the NIR. In response to questions raised by the ERT during the review, Germany explained that this was mainly due to the land conversion from grassland in the narrow sense to cropland peaking between 2001 and 2005. However, the ERT considers it unlikely that the entire change would take place in a single year with the carbon stock changes in the living biomass pool being relatively uniform before and after this sharp reduction. The ERT concludes that this could potentially be related to lack of time-series consistency in the data and methods and deserves greater attention. In order to ensure time series consistency, the ERT recommends that the Party evaluate the inventory methodology for land converted to cropland, particularly with regard to using data from surveys differing in their coverage and methods, transparently describing this issue and documenting how the time-series consistency issues have been addressed in its next annual submission.

3. Non-key categories

Wetlands – CO₂

97. Germany has chosen to report all of its wetlands using two subcategories: “wetlands (terrestrial)”, including semi-undrained bogs and other wetlands; and “waters”, which are open waterbodies free from anthropogenic influences. It is not clear from the NIR how the emission estimations have been performed for individual categories within “wetlands (terrestrial)”. The ERT considers it is not transparent to subsume all wetlands in a single category without providing transparent information on the methodology and EFs used for each wetlands subcategory. For example, peatlands (peat extraction areas) is a clearly defined wetlands subcategory in the IPCC good practice guidance for LULUCF, with a distinct methodology and EFs, but it has not been treated as such in the NIR. In response to the recommendation made in the previous review report that Germany report subdivisions, such as extracted peatlands and natural or re-established wetlands, to improve transparency, Germany included two subdivisions for wetlands: “wetlands (terrestrial)” and “waters”, without providing transparent information on the methodology and EFs used for individual subcategories within each of these, such as for peat extraction areas. The ERT recommends that Germany report the emissions and removals from wetlands according to the wetlands subcategories defined in the IPCC good practice guidance for LULUCF and provide transparent information on the detailed estimation methodology followed for each of these individual subcategories in the next annual submission.

F. Waste

1. Sector overview

98. In 2010, emissions from the waste sector amounted to 12,238.91 Gg CO₂ eq, or 1.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 71.6 per

cent. The key driver for the fall in emissions is a decrease in the amount of solid organic waste sent to landfills as a result of strict regulations and strategies in force since 2005, including the prohibition of landfilling of biodegradable waste (now requiring pre-treatment prior to disposal), and the increasing recycling of organic materials. Within the sector, 73.3 per cent of the emissions were from solid waste disposal on land, followed by 19.4 per cent from wastewater handling and 7.3 per cent from other (waste).

99. Germany has made recalculations for the waste sector between the 2011 and 2012 annual submissions owing to updated AD. The impact of these recalculations on the waste sector is an increase in the estimated emissions of 10.8 per cent for 2009. The main recalculations took place in the following categories:

(a) Solid waste disposal on land – CH₄ (increase in emissions by 1,281.00 Gg CO₂ eq or 15.1 per cent);

(b) Other (compost) – CH₄ and N₂O (decrease in emissions by 16.69 Gg CO₂ eq or 1.8 per cent).

100. The information provided in the NIR and the CRF tables is generally transparent. However, the country-specific methodologies and EFs are not in all cases adequately explained and referenced (see para. 102 below). The applied methodologies are in line with the IPCC good practice guidance and are consistent across the time series. The uncertainty assessment and category-specific QA/QC and verification have been implemented for all the categories. The details of those procedures are transparently documented in the NIR.

2. Key categories

Solid waste disposal on land – CH₄

101. The ERT commends Germany for its effort to respond to recommendations in the previous review reports. For example, the ERT welcomes Germany's updating of the provisional data on CH₄ emissions and CH₄ recovery used for the 2011 annual submission. During the review, the ERT also requested an update on implementation of the recommendation in the previous review report to collect data from landfills in the after-closure phase. In response to the questions raised by the ERT during the review regarding the recommendations in the previous review report, the Party informed the ERT that the German Federal Statistical Office has obtained the quantities of landfill gas for all the landfill sites in the after-closure phase for the first time for 2011 and stated that it intends to use the data in the 2013 annual submission for the first time, including recalculations for the previous years. The ERT recommends the Party implement this improvement for its next annual submission.

102. The information provided in the NIR and the CRF tables is generally transparent. However, the ERT noted that the explanations of country-specific methodologies and waste management practices, especially on mechanical-biological waste treatment (MBT), in the NIR are very limited and ambiguous. The ERT recommends that Germany provide further information, such as an overview of the range of techniques employed by MBT processes (how it works and inputs and outputs of waste) and their correlation to emissions for other subcategories of the waste sector, in the NIR of the next possible annual submission, in order to improve the transparency of its reporting.

Wastewater handling – CH₄ and N₂O

103. According to the NIR, municipal wastewater facilities treat more than 65 per cent of the treated industrial wastewater and the rest of it is treated in the industrial producers' own facilities. Table 270 of the NIR shows some significant industrial sources producing 95 per cent of organic wastewater in the country (including mainly chemical, paper and cardboard,

energy production and distribution). In response to the question raised by the ERT during the review regarding the values of total organic product for industrial wastewater in CRF table 6.B1 which are reported as “NE”, the Party informed the ERT that currently the values are unavailable but under review and research. The ERT recommends that the Party obtain these values and provide them in the next possible annual submission, in order to improve the transparency of its reporting.

104. In response to a question raised by the ERT during the review, the Party informed the ERT that the notation key “NE” reported for the value of total organic product for the subcategory wastewater handling – domestic and commercial wastewater sludge will be corrected to not applicable (“NA”), because the sludge has been treated as a part of wastewater in digestion towers and therefore does not contain any organic part (consistent with definition in the Revised 1996 IPCC Guidelines, Reference Manual, pp. 6.13 and 6.19). Also, the ERT noted that for the subcategory wastewater handling – domestic and commercial wastewater sludge, CH₄ emissions are reported as “NO” while CH₄ recovery is reported as “NA”. In response to the question raised by the ERT during the review, the Party informed the ERT that both of these will be corrected to “NO” since no CH₄ is generated during the process. The ERT recommends that the Party review the use of notation keys in the CRF tables in order to improve the consistency of its reporting, and update the notation keys, as appropriate, in its next annual submission.¹³

105. The ERT noted that CH₄ emissions and recovery for industrial wastewater in CRF table 6.B1 are reported as “NA”. The NIR states that industrial wastewater and sludge are partly treated anaerobically and that CH₄ produced is collected and used for energy recovery, or flared; thus the treatment of industrial wastewater releases no significant amount of CH₄ emissions. In response to the questions raised by the ERT during the review, the Party informed the ERT that it does not currently have sufficient information to justify this; however, the notation key for recovery will be corrected to “IE” because those data are reported in the energy sector under the category manufacturing industries and construction. The ERT reiterates the recommendation in the previous review report that the Party provide, in the next possible annual submission, more details on the treatment of wastewater in the country to sufficiently justify that no CH₄ emissions are produced in the process, in order to improve the transparency of its reporting.

106. The ERT noted that the NIR states that one of the ways to manage sewage sludge from biological wastewater treatment is recycling for substance recovery, and these emissions are not reported under wastewater and sludge treatment but in the agriculture sector. In response to the question raised by the ERT during the review, the Party provided the ERT with a table showing the breakdown of substance recovery and use of sewage sludge from biological wastewater treatment. The ERT encourages the Party to include such information in the NIR of its next annual submission in order to improve the transparency of its reporting and the consistency in the allocations of emission estimates across different categories.

107. During the review, the ERT asked Germany whether it has any plans to develop country-specific methane conversion factors for cesspools and septic tanks (this would be appropriate for a key category). The Party informed the ERT that the research on this issue is still in progress. The ERT recommends that the Party increase its effort and include the results of its research work in the NIR of the next possible annual submission.

¹³ In response to the draft review report, Germany informed the ERT that this recommendation is implemented in its 2013 submission.

3. Non-key categories

Other (waste) – CH₄ and N₂O

108. The ERT encourages the Party to include a table similar to NIR table 272 or a waste management stream/flow chart showing the summary of the AD for waste managed in and out of mechanical-biological waste treatment system in its next annual submission. Such information would improve the transparency of the reporting and enable the emission estimates of CH₄ and N₂O for this category to be efficiently and properly assessed.

Waste incineration – CO₂, CH₄ and N₂O

109. The ERT encourages the Party to provide general information on oxides of nitrogen (NO_x), NMVOC and sulphur dioxide (SO₂) emissions from cremation reported under waste incineration in the NIR of its next possible annual submission, in order to improve the transparency of its reporting.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

110. Germany provided supplementary information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the requirements outlined in paragraphs 5 to 9 of the annex to decision 15/CMP.1. The information corresponding to the years 2008, 2009 and 2010 was reported in the KP-LULUCF CRF tables and in chapter 11 of the NIR, following the annotated outline of the NIR. The NIR clearly distinguishes these activities from the emissions from sources listed in Annex A to the Kyoto Protocol.

111. Germany elected forest management for the activities under Article 3, paragraph 4, of the Kyoto Protocol. Germany chose to account for activities under Article 3, paragraphs 3 and 4, at the end of the first commitment period. Germany has identified the units of land subject to afforestation, reforestation and deforestation activities and the lands subject to forest management activity using reporting method 1 from the IPCC good practice guidance for LULUCF, with the national boundary being the geographic location of the boundaries of areas that encompass these activities. The definitions of forest and the land identification system used to determine the areas subject to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are in accordance with the IPCC good practice guidance for LULUCF.

112. Germany's national land identification and representation system is able to identify lands up to a resolution consistent with its national definition of forests (minimum area of land – 0.1; tree crown cover – 10 per cent; tree height at maturity – 5 m). However, the spatial unit used to identify units of land subject to activities under Article 3, paragraph 3, of the Kyoto Protocol has not been transparently provided in section 11.2.1 of the NIR. The ERT recommends that Germany provide transparent information on this in its next annual submission.

113. Germany has made recalculations for the KP-LULUCF activities between the 2011 and 2012 annual submissions, owing mainly to revisions to the land-tracking system and revised values of mineral soil carbon and litter pools, as discussed in the section on the LULUCF sector under the Convention (see sections 7.1.3, 7.1.5 and 7.2.4.3 of the NIR). The impact of these recalculations was that the estimated net removals from KP-LULUCF

activities increased by 3.9 per cent. The impact of these recalculations on each KP-LULUCF activity for 2009 is as follows:

(a) Afforestation and reforestation: the estimated removals from afforestation and reforestation lands not harvested increased by 1,118.02 Gg CO₂ eq (or 23.4 per cent), owing to the changes to the LUM and the EFs for mineral soils and litter;

(b) Deforestation: the estimated emissions from deforestation lands were reduced by 959.78 Gg CO₂ eq (or 90.1 per cent), owing to the changes to the LUM and the EFs for mineral soils and litter;

(c) Forest management: the estimated removals from forest management were reduced by 1,118.88 Gg CO₂ eq (or 5.5 per cent), owing to the changes to the LUM and the EFs for mineral soils and litter.

114. Germany has provided some information on the recalculations, but the NIR lacks transparent information on how the changes to the LUM, transition period and EFs for mineral soils and litter have impacted the estimation of emissions or removals from afforestation and reforestation, deforestation and forest management activities (see para. 116 below).

115. Germany has not provided an uncertainty assessment specifically for the KP-LULUCF categories in line with the requirements of the IPCC good practice guidance for LULUCF and decision 17/CMP.1. This issue was raised in the previous review report. The ERT encourages the Party to provide a separate uncertainty analysis for the KP-LULUCF categories to improve the transparency of its reporting and to better identify the areas for improvement in its next annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Deforestation – CO₂

116. As a result of recalculations performed, emissions from deforestation for 2009 have been reduced by 90.1 per cent. This revision affects all the carbon pools. The recalculation has not been transparently described in the NIR and there is no clear description of how it affects the various pools. In response to a question raised by the ERT during the review, Germany provided some information stating that the recalculation was due to: the new system of tracking land-use change that allows better tracking of the timing of deforestation; the new LUM that caused revisions to the land-use categories following land use conversion from forest land; and changes in the methodology for estimating carbon stock changes in mineral soils. The ERT recommends that Germany provide complete and transparent information on the process of recalculation, including detailed information on the changes in all the elements described above, in the next annual submission.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO₂

117. Germany has reported carbon stock changes in mineral soils in forest management as “NO”, providing transparent and verifiable information that it is not a net source in the NIR using results from BZE I. However, the NIR states (section 7.2.4.4.1) that a second soil inventory is being conducted and its results would be used to demonstrate that a mineral soil carbon pool is not a net source. This issue was raised in the previous review report. The NIR mentions that the results from the second soil survey have not been included in the CRF tables as they are still provisional. However, the ERT believes that they could still be used in the NIR to demonstrate that the mineral soil carbon pool is not a net source. The ERT recommends that the Party include the results of the second soil

survey (BZE II) to transparently demonstrate that the mineral soil carbon pool is not a net source in its next annual submission.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

118. Germany has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF comparison report.¹⁴ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

119. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

National registry

120. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding 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 decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

Calculation of the commitment period reserve

121. Germany has reported its commitment period reserve in its 2012 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (4,381,287,024 t CO₂ eq), as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

122. Germany reported that there are changes in its national system since the previous annual submission. In response to a recommendation in the 2010 annual review report the institutional framework for the LULUCF and KP-LULUCF reporting has been strengthened and made more transparent, with an agreement with BMELV (2012) for the preparation of GHG emission data and carbon inventories of category/sink groups 4 and 5, and a quality management system has been established within vTI, in consultation with UBA. The Party described the change in its NIR. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

¹⁴ The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

4. Changes to the national registry

123. Germany reported that there are changes in its national registry since the previous annual submission. The emission trading registry software and hardware have been updated during 2011 to increase the safety and performance of the system. The Party described the change in its NIR. The ERT concluded that, taking into account the confirmed changes in the national registry, 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 relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

124. Germany reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent. Also in the NIR, Germany lists a series of regulations at the European level that control or influence market conditions, fiscal incentives, tax and duty exemptions and subsidies in all economic sectors in European Union (EU) member States. Particular mention is made to the EU ETS and the regulation of biofuels. The impact assessment of new policy initiatives has been established in the EU, which allows their potential adverse social, environmental and economic impacts on various stakeholders, including developing country Parties, to be identified and limited at an early stage within the legislative process.

125. In addition, in the NIR Germany lists a series of national measures that limit subsidies and deregulate many sectors of the national economy, including electricity production deregulation, reduction of subsidies in coal production, increased efficiency of final uses and the promotion of the use of renewable energy. An analysis of the possible impact on developing countries of those measures is also reported. Moreover, several cooperative initiatives with Parties not included in Annex I to the Convention (non-Annex I Parties) are reported in the NIR, regarding the diffusion of new technologies and efficiency improvements related to fossil fuel use.

III. Conclusions and recommendations

A. Conclusions

126. Germany made its annual submission on 13 April 2012. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units and changes to the national system and the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

127. The ERT concludes that the inventory submission of Germany has been prepared and reported in accordance 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". The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2010 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as complete in terms of categories and gases.

128. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1

129. Germany's inventory is in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT commends Germany for the efforts to improve the quality of its inventory by: the implementation of the QA/QC procedures in those institutions outside UBA which participate in the inventory preparation; the estimation of the potential emissions of HFCs, PFCs and SF₆ using the equation of the Revised 1996 IPCC Guidelines; and the clarification of the current arrangements among agencies and organizations involved in the collection of the land use data to ensure the consistency and the timeliness of the data.

130. The Party has made recalculations for the inventory between the 2011 and 2012 annual submissions in order to take into account a range of methodological issues, some which led to significant changes in the affected categories (especially for the industrial processes, agriculture and LULUCF sectors). The impact of these recalculations on the national totals is a decrease in the estimated emissions of 0.9 per cent for 2009.

131. Germany provided supplementary information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the requirements outlined in decision 15/CMP.1, annex, paragraphs 5–9. Germany elected to account for forest management under Article 3, paragraph 4, of the Kyoto Protocol. The definition of forest and the land-identification system used to determine the areas subject to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are in accordance with the IPCC good practice guidance for LULUCF. The Party has elected commitment period accounting.

132. Germany has made significant recalculations for the KP-LULUCF activities between the 2011 and 2012 annual submissions, owing mainly to revisions to the land-tracking system and revised values of mineral soil carbon and litter pools. The overall impact of these recalculations was that the estimated net removals from KP-LULUCF increased by 3.9 per cent.

133. Germany has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1.

134. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

135. 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 CMP decisions.

136. Germany has reported information under decision 15/CMP.1, annex, chapter I.H, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", as part of its 2012 annual submission. The information was provided on 13 April 2012.

137. The impact assessment of new policy initiatives has been established in the EU, which allows their potential adverse social, environmental and economic impacts on various stakeholders, including developing country Parties, to be identified and limited at an early stage within the legislative process. The initiatives include a series of regulations at the European level that control or influences market conditions, fiscal incentives, tax and duty exemptions and subsidies in all economic sectors. Several cooperative initiatives with non-Annex I Parties are reported in the NIR, regarding the diffusion of new technologies and efficiency improvements related to fossil fuel use.

B. Recommendations

138. The ERT identifies issues for improvement as listed in table 6 below.

Table 6
Recommendations identified by the expert review team

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph reference</i>
General	Transparency	Improve the transparency of reporting by providing: a justification of the country-specific EFs and assumptions used; an explanation of the fluctuations of the AD and parameters (e.g. in the energy and LULUCF sectors); and more detail on the methods and EFs used	24
	Follow-up to previous reviews	Fully implement the recommendations from the previous review report that have not yet been addressed due to the late finalization of the review report	27
Energy	Reference approach	Include a detailed analysis of emission discrepancies at the primary sources level	38
		Describe in more detail the elaboration of the reference approach, providing a comparison not only of CO ₂ emissions but also of AD used	39
		Make comparisons with IEA data at the primary fuel-type level and explain the reasons for differences between the inventory data and the corresponding IEA data	41
	Feedstocks and non-energy use of fuels	Provide justification for the carbon storage fractions	45
		Include additional information for feedstocks and non-energy use of fuels in CRF table 1.A(d)	46
	Stationary combustion: solid fuel – CO ₂	Provide descriptions of the main drivers behind the changes in AD, as well as the underlying rationale for the country-specific EFs applied	47
	Stationary combustion: biomass – CH ₄ and N ₂ O	Include information on the increased use of biomass as a basis for the explanation of changes in the related AD and combustion technologies and provide a brief explanation on why the value of the IEF is very low in the next NIR	48
Provide a brief explanation of the changes in the use of sewage gas and the increased co-firing of waste in the next NIR		49	
Industrial processes and solvent and product use	Sector overview	Improve the transparency of its reporting by providing information on all undertaken recalculations in CRF table 8(b)	55
		Report on the progress of the project to verify emission	56

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph reference</i>
		estimates from the industrial processes sector using EU ETS data	
	Lime production – CO ₂	Justify and transparently describe the estimation methods used, including assumptions made, and ensure that the lime production AD are complete	60
		Include in the NIR short summaries of comparisons made between inventory data and other sources, such as the EU ETS data, briefly explaining the key reasons for the differences	
	Ammonia production – CO ₂	Clearly explain in the NIR in which category or categories emissions from ammonia production are reported	62
		Use the notation key “IE”, instead of “NO”, for reporting recovered CO ₂ in the CRF tables	
		Include in the NIR information on how the carbon content in heavy fuel oil is decided and, if appropriate, any other feedstock used to calculate emissions from ammonia production	64
	Adipic acid production – N ₂ O	Give a more specific and precise description of methodological issues for the calculation of the reported N ₂ O emissions (e.g. precisely for what years the IPCC default EF is used, methods used to decide N ₂ O emissions at each plant)	65
	Chemical industry: other – CO ₂	Include a more detailed description of methodological issues in the 2013 submission, including explanations on whether the emissions are the result of fuel use for the production of energy	66
		Verify the reported emissions using EU ETS data and report the result of the verification in 2013 submission	67
	Iron and steel production – CO ₂	Give evidence that there is consistency between inventory and EU ETS data and that the reported emissions are accurate	69
	Consumption of halocarbons and SF ₆ – HFCs	Improve the documentation in the NIR by providing some details from the trilateral review of the F-gas inventories, including a summary of the rationale for its conclusions	71
		Correct the ratio between potential and actual emissions in the next NIR	72
Agriculture	Manure management – CH ₄	Provide detailed information on the amount of treated manure used as biogas	82
	Manure management – N ₂ O	Provide well-documented information on the housing systems of cattle and swine, herd size, detailed descriptions of the manure system (e.g. to specify how often cattle and swine faeces and urine are removed	85

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph reference</i>
		from floors of pig and cattle housing) or recalculate the emissions by the using the N ₂ O EF from the Revised 1996 IPCC Guidelines	
LULUCF	Sector overview	Provide detailed and transparent information on how areas under different land-use categories have been reallocated as a result of the change in the transition period, and the impact on the IEFs for different land-use categories	89
		Examine all such cases where changes in pools for different land uses have been reported as “NO” and report them using other appropriate notation keys as necessary	90
		Revise the uncertainty assessment for agricultural lime application	91
		Provide transparent information on the category-specific QC checks for all categories for the LULUCF sector	93
	Forest land remaining forest land – CO ₂	Evaluate the inventory methodology with regard to the use of data from a variety of sources that differ in their coverage and methods, transparently documenting how the time-series consistency issues have been addressed	94
	Land converted to forest land – CO ₂	Transparently describe the methodology used, clearly demonstrating its consistency with the methodology provided in the IPCC good practice guidance for LULUCF	95
	Land converted to cropland – CO ₂	Evaluate the inventory methodology, particularly with regard to using data from surveys differing in their coverage and methods, transparently describing this issue and documenting how the time-series consistency issues have been addressed	96
	Wetlands – CO ₂	Report according to the subcategories defined in the IPCC good practice guidance for LULUCF and provide transparent information on the detailed estimation methodology followed for each of these individual subcategories	97
Waste	Solid waste disposal on land – CH ₄	Use quantities of landfill gas for all the landfill sites in the after-closure phase and conduct consequent recalculations for previous years	101
		Provide further information, such as an overview of the range of techniques employed by mechanical-biological waste treatment processes (how it works and inputs and outputs of waste) and their correlation to the emissions for other subcategories of the waste sector	102
	Wastewater handling	The Party should obtain values of total organic product for industrial wastewater and include in next	103

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph reference</i>
	– CH ₄ and N ₂ O	submission	
		Review the use of notation keys in the CRF tables	104
		Provide more details on the treatment of wastewater in the country to sufficiently justify that no CH ₄ emissions are produced in the process	105
		Increase effort on the development of country-specific values of methane conversion factors for cesspools and septic tanks and include the results of its research work	107
Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol	Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Provide transparent information on the spatial unit used to identify units of land subject to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the NIR	112
	Deforestation – CO ₂	Provide complete and transparent information on the process of recalculation, including detailed information on all changes	116
	Forest management– CO ₂	Include the results of the second soil survey (BZE II) to transparently demonstrate that the mineral soil carbon pool is not a net source	117

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, EU ETS = European Union Emissions Trading Scheme, IE = included elsewhere, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, LULUCF = land use, land-use change and forestry, NIR = national inventory report, NO = not occurring, QC = quality control.

IV. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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

Intergovernmental Panel on Climate Change. *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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FCCC/ARR/2011/DEU. Report of the individual review of the annual submission of Germany submitted in 2011. Available at <http://unfccc.int/resource/docs/2012/arr/deu.pdf>.

UNFCCC. *Standard independent assessment report*, parts I and II. Available at http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Michael Strogies (Federal Environment Agency), including additional material on the methodologies and assumptions used. The following documents¹ were also provided by Germany:

Calculations of gaseous and particulate emissions from German agriculture 1990–2010.

¹ Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
C	carbon
C ₂ F ₆	hexafluoroethane
CH ₄	methane
CF ₄	tetrafluoromethane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
LUM	land-use matrix
Mt	million tonnes
N	nitrogen
N ₂ O	nitrous oxide
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
NIR	national inventory report
NMVOCS	non-methane volatile organic compounds
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF ₆	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10 ¹² joule)
UNFCCC	United Nations Framework Convention on Climate Change