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GERMANY

REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2004[1]

EXECUTIVE SUMMARY

1. This report covers the in-country review of the 2004 greenhouse gas (GHG) inventory submission of Germany, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8 of the Conference of the Parties. The review took place from 27 September to 1 October 2004 in Berlin, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalist – Ms. Helen Plume (New Zealand), Energy – Ms. Sophia Mylona (Norway), Industrial Processes – Ms. Suvi Monni (Finland), Agriculture – Ms. Anna Romanovskaya (Russian Federation), Land-use Change and Forestry – Mr. Jozef Mindas (Slovakia), Waste – Mr. José Villarin (Philippines). Ms. Helen Plume and Mr. José Villarin were the lead reviewers. The review was coordinated by Ms. Astrid Olsson and Mr. Roberto Acosta (UNFCCC secretariat).

2. In accordance with the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Annex I Parties", (hereinafter referred to as UNFCCC review guidelines), a draft version of this report was communicated to the Government of Germany, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

3. In the year 2002, the most important greenhouse gas in Germany was carbon dioxide (CO_2), contributing 85.2 per cent to total[2] national greenhouse gas emissions expressed in CO_2 equivalent, followed by methane (CH_4) – 8.0 per cent – and nitrous oxide (N_2O) – 5.5 per cent. Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) taken together contributed 1.3 per cent of the overall greenhouse gas emissions in the country. The Energy sector accounted for 85.5 per cent of total GHG emissions followed by Agriculture (8.7 per cent), Industrial Processes (4.2 per cent) and Waste (1.4 per cent).

4. Total greenhouse gas emissions (excluding Land-use Change and Forestry) amounted to 1,014,627 Gg CO_2 equivalent and decreased by 18.6 per cent from 1990 to 2002. Tables 1 and 2 provide data on emissions by gas and by sector from 1990 to 2002. Over the period 1990–2002, CO_2 emissions decreased by 14.9 per cent, mainly because of a decrease in emissions from fuel combustion in the Energy sector (e.g., from energy industries and manufacturing and construction). CH_4 emissions decreased during the same period by 41.7 per cent mainly because of reductions in the Waste sector (solid waste disposal on land) and in the Agriculture sector (enteric fermentation and manure management); N_2O emissions decreased by 31.4 per cent over the same period because of reductions in the Industrial Processes sector (adipic acid production) and the Agriculture sector (decreased fertilizer use). Emissions from HFCs increased by 135.0 per cent; PFC emissions decreased by 70.8 per cent; and emissions of SF_6 increased by 7.7 per cent. The trends observed for all the gases are reasonable given the national

[1] In the symbol for this document, 2004 refers to the year in which the inventory was submitted, and not to the year of publication.

[2] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding Land-use Change and Forestry, unless otherwise specified.

circumstances of Germany after reunification and the general global trends in the production and consumption of the fluorinated gases.

5. In its 2004 submission Germany provided a complete set of common reporting format tables (1990–2002) together with a national inventory report prepared using the new reporting guidelines. Germany has benefited from the new reporting guidelines as these assisted with the submission of a more complete and transparent report compared to previous years. There are still some issues to be addressed regarding the completeness of the submission, in particular relating to the reporting of recalculations, the explanations regarding the use of notation keys, and the provision of a reference approach in the Energy sector for all years. In addition clearer and better organized documentation regarding methodologies applied and actual calculations used would add considerably to the transparency of the reporting.

6. Across all sectors the expert review team recommends that Germany improve its institutional arrangements for the collection of activity data. The expert review team recognizes the problems faced by Germany in producing a consistent time series from 1990 onwards, and encourages Germany to continue its efforts to harmonize data, particularly in the Energy sector, which dominates Germany's greenhouse gas inventory.

7. Germany has a well developed national system for its inventory, coordinated by the Federal Environment Agency, and is in the process of moving to higher-tier methodologies where these are appropriate according to 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). Germany clearly demonstrated to the expert review team that the findings from previous reviews are being actively addressed within the inventory development and improvement process. Germany also has a high level of awareness of the areas in its reporting that require improvement.

8. A detailed quality assurance/quality control plan is almost complete, and the process of quantifying uncertainties has begun. In all sectors the expert review team recommends a more coordinated approach between completion of the common reporting format tables and the national inventory report to ensure that inconsistencies are avoided.

Table 1. Greenhouse gas emissions by gas, 1990–2002

GHG emissions	Gg CO_2 equivalent													Change from 1990–2002 %
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
CO_2 (with LUCF)[a]	1,023,087.65	984,372.47	936,375.44	926,628.70	911,762.67	907,131.24	929,479.42	898,173.44	890,426.03	863,182.06	874,369.68	888,072.32	878,023.26	–14.2
CO_2 (without LUCF)	1,015,572.42	977,468.11	929,898.02	920,186.80	906,063.34	901,478.32	923,792.38	892,422.63	884,500.74	857,281.13	860,272.66	874,263.81	864,116.77	–14.6
CH_4	139,766.68	128,656.69	124,879.40	120,481.87	115,707.41	109,173.08	104,707.69	101,214.08	95,766.69	92,236.22	86,548.58	83,000.30	81,446.65	–41.7
N_2O	81,375.33	77,885.15	79,126.19	75,884.94	72,192.81	73,470.23	75,092.12	72,641.80	59,408.81	55,725.14	55,812.95	56,112.50	55,833.05	–31.4
HFCs	3,510.00	3,547.44	3,676.53	4,950.42	5,178.00	6,359.92	5,768.12	6,355.72	6,978.97	7,280.11	6,630.04	8,129.69	8,247.14	–135.0
PFCs	2,696.00	2,356.19	2,138.20	2,012.00	1,627.35	1,758.78	1,722.75	1,376.60	1,481.43	1,247.19	789.70	722.92	785.94	–70.8
SF_6	3,895.70	4,349.80	4,875.60	5,401.40	5,807.70	6,889.69	6,358.65	6,267.61	6,038.12	4,414.19	4,017.98	3,325.31	4,197.08	–7.7
Total (with CO_2 from LUCF)	**1,254,331.36**	**1,201,167.73**	**1,151,071.36**	**1,135,359.34**	**1,112,275.94**	**1,104,782.95**	**1,123,128.76**	**1,086,029.26**	**1,060,100.04**	**1,024,084.91**	**1,028,168.93**	**1,039,363.04**	**1,028,533.12**	**–18.0**
Total (without CO_2 from LUCF)	**1,246,816.13**	**1,194,263.38**	**1,144,593.94**	**1,128,917.43**	**1,106,576.61**	**1,099,130.03**	**1,117,441.72**	**1,080,278.45**	**1,054,174.75**	**1,018,183.98**	**1,014,071.90**	**1,025,554.54**	**1,014,626.63**	**–18.6**

[a] LUCF = Land-use Change and Forestry

Table 2. Greenhouse gas emissions by sector, 1990–2002

GHG source and sink categories	Gg CO_2 equivalent													Change from 1990–2002 %
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
Energy	1,038,760.78	1,001,374.41	952,678.95	941,110.24	922,509.21	913,923.10	936,274.98	902,950.80	892,817.01	864,156.08	864,191.95	877,173.75	867,037.88	–16.5
Industrial Processes	60,296.33	57,660.00	61,176.44	60,349.70	61,152.06	63,805.31	62,246.97	61,259.33	48,538.18	43,222.25	41,786.24	42,459.13	43,012.57	–28.7
Solvent Use	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	1,922.00	0
Agriculture	109,918.55	97,735.08	93,938.08	91,681.28	90,060.95	91,144.70	91,153.12	90,802.66	89,795.94	90,260.62	89,378.45	88,742.92	88,299.46	–19.7
LUCF[a]	7,515.23	6,904.35	6,477.43	6,441.91	5,699.33	5,652.92	5,687.04	5,750.81	5,925.29	5,900.93	14,097.02	13,808.51	13,906.49	+85.0
Waste	35,918.47	35,571.88	34,878.47	33,854.20	30,932.39	28,334.92	25,844.66	23,343.66	21,101.62	18,623.03	16,793.26	15,256.74	14,354.72	–60.0
Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	

[a] LUCF = Land-use Change and Forestry

I. OVERVIEW

A. Inventory submission and other sources of information

9. Germany submitted a national inventory report (NIR) on 30 April 2004. However, the NIR was in German and the English translation was received much later. The expert review team (ERT) notes that earlier receipt of the NIR in English would facilitate all aspects of the review process.

10. In its 2004 submission, Germany submitted a complete set of common reporting format (CRF) tables for the years 1990–2002.

11. During the review Germany provided the ERT with additional information sources. These documents are not part of the inventory submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in annex 1 to this report.

B. Key sources

12. Germany has reported a key source tier 1 analysis, both level and trend assessment, as part of its 2004 submission. The key source analysis performed by the Party and the secretariat[3] produced different results. This is mainly because Germany uses a higher level of disaggregation in its key source analysis than was applied by the secretariat. There is general agreement between the two analyses when the analysis done by Germany is aggregated to the level applied by the secretariat. There are, however, some small source categories that only occur in the secretariat's analysis as a key source on trend but occur in Germany's analysis as key sources on level (e.g., Mobile Combustion: Aircraft – CO_2 and Adipic Acid Production – N_2O). Germany has indicated in annex 1 of its NIR that it understands the application of the key source analysis to the choice of methods for estimating emissions, and it appears that the analysis is used as one driving factor for preparation of the inventory. Closer attention to the results of the key source analysis could further assist with the allocation of resources for development of the inventory.

C. Cross-cutting topics

Completeness

13. Germany has provided a complete set of CRFs for the years 1990–2002 which covers all sectors and source/sink categories. Both actual and potential emissions are reported where appropriate. There are gaps in the CRF. Tables 8(a) and 8(b) (Recalculations) are not reported for all years although it is clear from both the CRF and the NIR that recalculations have been made. Table 9 (Completeness), where explanation of the use of the notation keys "included elsewhere" ("IE") and "not estimated" ("NE") is requested, has not been filled in at all. The reference approach (table 1.A(b)) has not been completed in the CRFs for the years 1999–2002. Germany is aware of these issues of completeness and informed the ERT that it will be addressing them in future submissions.

Transparency

14. Germany has followed the NIR structure outlined in the new reporting guidelines and this has greatly improved the transparency of the inventory submission. The NIR provides an overview of the institutional arrangements for inventory preparation, including the development of Germany's national inventory system. It also provides an overview of the methods, responsibilities and data flows for the calculation of emissions in each sector, with more detail provided in each of the sector chapters and in annexes that form part of the NIR. The ERT concludes that most of the necessary information is in the

[3] The secretariat had identified, for each individual Party, those source categories which are key sources in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

NIR but better organization would make it more accessible. To increase the transparency of the NIR, the ERT recommends that Germany consider making more use of annexes for detailed technical information and providing more straightforward information in the body of the NIR itself.

15. Trends in national greenhouse gas emissions are clearly explained in chapter 2 of the NIR. The ERT encourages Germany to provide a small amount of additional explanatory information on trends in the sector chapters.

16. Some of the emissions data available to the Federal Environment Agency (UBA) are confidential, but complete reporting is achieved by aggregating data. All confidential information was provided to the review team, and this facilitated the review.

Recalculations and time-series consistency

17. The ERT recognizes the problems (related to reunification) that Germany has in producing a consistent time series from 1990 onwards, and recommends that Germany continue its efforts to harmonize its time-series information.

18. The ERT noted that currently recalculations are not reported in a transparent manner as the Party is not using table 8 of the CRF. The secretariat's analysis shows that in the 2004 submission data for both the base year (1990) and the year 2001 have undergone recalculations. Although table 8 has not been used, some explanations are included in the NIR. According to the NIR the major changes include the entire time series of CH_4 emissions from landfilling of solid waste (recalculated using tier 2 methodology), N_2O from agricultural soils (to reflect a change of methodology), CH_4 and N_2O from manure management (following changes in the methane correction factor (MCF) and methodology, respectively), and CH_4 from enteric fermentation (revised activity data (AD)).

19. The ERT was informed that there are a number of activities currently under way to improve the inventory data and that Germany intends to report recalculations more fully in its next submissions (2005 and 2006). The ERT encourages Germany to use the CRF tables provided to assist its reporting in this regard.

Uncertainties

20. Qualitative uncertainty information is provided in the CRF. Work has begun to establish quantitative uncertainties pursuant to IPCC tier 1, and the status of this project is detailed in an annex to the NIR. So far quantitative uncertainties are available for the Energy sector and part of the Industrial Processes sector. The ERT encourages Germany to complete this work and to apply the results when establishing priorities for inventory improvement in the future.

Verification and quality assurance/quality control approaches

21. The NIR states that a quality assurance/quality control (QA/QC) plan is being prepared and further information was provided during the review. Germany told the ERT that it has not come as far as it would like with the QA/QC plan: the work is still to be completed. The ERT was further informed that Germany is working towards including the QA/QC plan in accordance with the IPCC good practice guidance in its next NIR. The ERT was provided with copies of the draft QA/QC handbook (in German only) which is for use both within the UBA and in outside agencies involved in inventory preparation, as well as the drafts of the QA plan, the QC plan, the improvement plan, the inventory plan and the QA/QC checklists (also only in German). These drafts are still under discussion. The ERT recognizes the advances being made by Germany in this area and encourages it to continue this effort.

Institutional arrangements

22. During the in-country visit, Germany explained the institutional arrangements for preparation of the inventory, and these are also well documented in the NIR. The UBA, as the single national entity for the inventory, has overall responsibility for the national inventory under the national inventory system (the Nationales System Emissionen or NaSE). The organizational arrangements for the national

inventory system involve coordination by the UBA, including initiation of measures for improvement, a central database (the Central System of Emissions or Zentrales System Emissionen (ZSE)) for emissions calculation, the reporting and archiving of information, and a Quality System for Emissions Inventories (Qualitäts-System Emissionsinventare, QSE) for implementation of the IPCC good practice guidance and continual improvement of the inventory. There is one coordinator for the NIR, one coordinator for the data and one coordinator for the national inventory system. Data flows within the system are well documented in the NIR. The ERT commends Germany's efforts in developing its national system.

23. In addition to the UBA, many other agencies, scientific organizations, industry associations and independent experts are also involved in the preparation of the inventory, including the collection of AD and the development of appropriate country-specific methodologies and emission factors (EFs). The ERT noted that there are several intra- and inter-agency working groups involved, including the UBA working group on emissions inventories, the inter-ministerial working group on CO_2 reduction, and the Working Group on Energy Balances of the Länder. There is also a "framework agreement" between the Federal Ministry of Consumer Protection, Food and Agriculture, and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety on data exchange and the operation of a joint database on emissions from agriculture. The ERT was informed that it is envisaged that more such agreements will follow.

24. The ERT concluded that there is a critical need to ensure ongoing data availability and quality, and that the system of collection of AD could be improved. It recommends that Germany consider putting the collection of national statistics onto a more reliable basis. Framework agreements as described above should help, as should planned improvements to the national inventory system, including pending legislation on implementing the GHG reporting requirements of the Kyoto Protocol with regard to institutional responsibilities and financing, and the development of contracts on data exchange with industrial and other independent organizations.

25. The ERT noted some inconsistencies between the information reported in the CRF and that reported in the NIR. In its institutional arrangements, Germany could consider better coordination between completing the CRF and completing the NIR to ensure that inconsistencies are avoided.

Record keeping and archiving

26. Germany has a centralized archiving system as part of its Nationales System Emissionen operated by the UBA. The electronic database backs up every submission and is able to provide documentation and history of data handling (e.g., it is able to record the date on which changes are made). In addition the NIR states that the final version of the data tables and the NIR are transferred onto CD and archived with clear identification information.

Follow-up to previous reviews

27. Germany informed the ERT of the actions taken to address the findings from previous reviews. Many of the presentations to the ERT during the in-country visit clearly showed that the findings from previous reviews were being actively addressed within the inventory development and improvement process. Germany told the ERT that is has not made as much progress as it would have liked in all areas. Major improvements include more detailed and comprehensive descriptions of the Energy and Agriculture sectors, quantitative uncertainty estimation for CO_2 in the Energy sector and part of the Industrial Processes sector, and detailed information on the development of the Quality System for Emissions Inventories.

D. Areas for further improvement

Identified by the Party

28. The NIR identifies several areas for improvement and these were expanded on during the review. These areas include: ongoing improvement in inventory methodologies, using country-specific methods where appropriate (here reporting of recalculations will follow from the application of new methodologies); and completion and implementation of the QA/QC plan. In addition, Germany reported to the ERT that it is working closely with another country (Finland) where experts from each country

work together to identify areas where improvements could be made. Germany is also undertaking a systematic approach to improving its national system whereby the findings of an upcoming workshop on the national system will be used to identify and develop approaches for improving the inventory. In its response to the issues raised during the review, Germany indicated that it will discuss the findings to decide what can be done in time for the next submission and what will take longer to incorporate into the reporting in the CRF and the NIR.

Identified by the ERT

29. The ERT identifies the following cross-cutting issues for improvement. The Party should:

(a) Continue its efforts to harmonize its time-series information;

(b) Provide more precise descriptions of methodologies that differ from the IPCC methodologies, while using annexes in the NIR to provide more technical and detailed information;

(c) Improve the timeliness of its reporting, particularly relating to the provision of the NIR in English;

(d) Address the gaps in the CRF, particularly relating to the recalculation tables and explanations of notation keys;

(e) Ensure that the information in the CRF and the NIR is consistent; and

(f) Improve the system for the collection of AD.

30. Recommended improvements relating to specific source categories are presented in the relevant sector sections of this report.

II. ENERGY

A. Sector overview

31. In the year 2002 the Energy sector accounted for 85.5 per cent of total national GHG emissions. CO_2 comprised 96.8 per cent of emissions from the Energy sector in 2002, while CH_4 and N_2O contributed 2.0 per cent and 1.1 per cent, respectively. Fuel combustion accounted for 98.1 per cent of the GHG total from the sector, and fugitive emissions for the remaining 1.9 per cent. Energy industries were clearly the largest contributor to the sectoral total (41.5 per cent in 2002), followed by Transport (20.9 per cent), Other Sectors (20.2 per cent) and Manufacturing Industries and Construction (15.3 per cent).

32. Total GHG emissions from the Energy sector decreased by 16.5 per cent during the period 1990–2002. This decline is primarily due to fuel conversion, efficiency improvements, the economic reconstruction in eastern Germany, and tax regulations on fuel use, as well as energy-saving measures in stationary combustion activities such as public power, district-heat generation and households.

Completeness

33. The CRF includes estimates of most gases and sources of emissions from the Energy sector as recommended by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines). Not included are: CO_2 emissions from fuel combustion activities in the reference approach for the years 2000–2002; disaggregation of emissions in all sub-source categories under 1.A.2 Manufacturing Industries and Construction; feedstocks and non-energy use of fuels for the years 2000–2002; the fraction of feedstocks which is combusted for the whole time series; fugitive emissions of CH_4 from some mining and oil and gas operations, as well as all corresponding releases of CO_2; and recalculations. Notation keys are used sufficiently, but no explanation of figures noted as "IE" or "NE" is given either in the respective documentation boxes or in table 9 Completeness. It is recommended that

Germany address the above matters in its future submissions. Further elaboration on these issues follows in the respective sections below.

34. The description of the Energy sector in the NIR has improved substantially since the 2003 submission. In particular, sub-source categories (including non-key sources) are discussed in more detail and in an internally consistent manner following the UNFCCC reporting guidelines.

Transparency

35. The information presented in the CRF tables is transparent with the exception of a few notation keys which need to be correctly assigned and specified further, both in the respective documentation boxes and in table 9 Completeness.

36. The NIR has been enriched with several new elements which increase its transparency considerably. In particular, the various aspects of sub-sources are addressed in a more comprehensive and systematic way than in last year's submission. The inclusion of a detailed discussion on the CO_2 EFs employed in the national inventory (chapter 13.8) has also been a valuable addition in this context. Germany is encouraged to include in the NIR a presentation of the EFs for CH_4 and N_2O used in the inventory, as it deems appropriate. The trends in the sub-source categories do not seem to be adequately discussed. Germany could consider addressing this issue either in chapter 2 Trends in GHG Emissions or in the presentation of individual sub-sources. In several areas, this additional information could suffice to explain the occurrence of outliers detected in previous review stages. Finally, some inconsistencies appear between the NIR and the CRF tables (e.g., manufacturing source categories are presented and recalculations for some sources are discussed in the NIR with no corresponding reference in the CRF tables). Germany should make efforts to ensure full consistency between these two reporting documents.

Recalculations and time-series consistency

37. No recalculations have been reported in the CRF tables for the years 1990–2002. However, the NIR includes descriptions of recalculations performed for the years 1995–2002 for several stationary source categories and for road transportation for the years 1990–2001. Germany specified that the reasons for recalculations in the Energy sector are primarily updates in the CO_2 EFs, new EFs for CH_4 and N_2O, the correction of errors in the CRF tables, the correction of AD noted earlier as preliminary, and some new EFs in the Transport subsector.

38. The reunification of Germany has inevitably triggered problems related to data consistency in terms of AD and EFs. However, Germany has been working continuously to improve consistency in this area. A central task is the review of EFs for CH_4 and N_2O for the entire time series 1990–2002, which is expected to be completed and incorporated in time for the next round of reporting. Otherwise, national experts reassured the ERT that the consistency of the energy balances during the period 1990–2002 is fully satisfactory. The ERT encourages Germany to continue work on improving the consistency in the inventory data.

Uncertainties

39. With only a few exceptions, a quantitative assessment of uncertainties is presented for the first time in the NIR for all stationary source categories in the Energy sector. The assessment refers primarily to EFs in energy combustion activities. The process of determining uncertainties is in accordance with tier 1 of the IPCC good practice guidance and is described adequately. A research project (see Research project 202 42 266, UBA, 2004) has also been launched in Germany aiming at implementing fully the IPCC good practice guidance requirements on uncertainty management. Results from this project are to be provided at a later stage. Qualitative assessment of uncertainties is included in the CRF tables for all source categories reported. The ERT encourages Germany to include an assessment of uncertainties in mobile combustion activities and incorporate the results of the research project in its future submissions.

Verification and quality assurance/quality control approaches

40. With only a few exceptions, the NIR discusses verification studies and QA/QC procedures followed in all energy source categories. Considerable progress is expected on this issue in the future as a comprehensive national plan for QA/QC is under preparation. The ERT fully encourages Germany's efforts in this direction.

B. Reference and sectoral approaches

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

41. The reasons for the discrepancies observed between the reference and sectoral approaches are discussed in the NIR but only for the period 1990–1999. Estimates of CO_2 emissions from fuel combustion activities in the reference approach have not been reported for the years 2000–2002. This is due to delays in the finalization of the national energy balances for these years. During the in-country visit, Germany explained that such delays are attributed primarily to limitations in human and financial resources. The last complete energy balance available is that for 1999. At present, balances for 2000 and 2001 are expected to be available by the end of 2004 and the balance for 2002 in mid-2005. However, some further financial and personnel resources have recently been allocated to this work, so that the energy balances for 2003, 2004 and 2005 will most likely be available by the end of 2006.

42. Germany has conducted a study involving comparison of the energy balances prepared by the individual Länder for 1998 and 1999 with those prepared at the federal level. National experts consider that the consistency of the results of the two approaches is acceptable. However, as deviations can often be as large as 5 per cent, Germany finds it appropriate to investigate the possibilities for refinements in the methodology used for data comparisons. This initiative is strongly encouraged by the ERT.

43. Comparison of the reference approach with international statistics (International Energy Agency (IEA)/Eurostat) for the period 1990–1999 is addressed adequately in the NIR. Germany explained that some reasons for discrepancies can be the lack of coordination between national institutions prior to reporting and the fact that international statistics may often be outdated versions of the data submitted to UNFCCC. Germany recognizes the importance of efficient coordination at the national level and plans to take some measures in this direction.

International bunker fuels

44. As required by the UNFCCC reporting guidelines, emissions from international marine and aviation transport are estimated but not included in the national inventory totals. It is possible to distinguish between domestic and international marine bunkers in the national energy balances on the basis of the tax system for fuel sold in ports. However, such a distinction is not possible in the case of air traffic emissions, as total fuel taxes on aircraft fuels are recorded under domestic sales. Germany assumes a conservative ratio of 20:80 between fuel consumption data in domestic and international aviation, respectively. At the same time, national experts are following closely work being done under a joint European Union project aiming at calculating emissions from national and international airports for the Member states, hoping to feed the findings of the project into the inventory work as soon as they are ready.

Feedstocks and non-energy use of fuels

45. Data on feedstocks and non-energy use of fuels have not been reported for the years 2000–2002 because the national energy balances for the same period are not complete. Furthermore, during the in-country visit Germany informed the ERT that the share of feedstocks that is combusted, and inevitably emitted (after the removal of carbon stored), is partly not included in the emissions estimates for Energy in the sectoral approach for the whole time series. It is strongly recommended that Germany correct this deficiency in its next submission and intensify its efforts to prepare timely and complete energy balances.

C. Key sources

Solid and other fuels – CO_2

46. The assessment conducted by the secretariat has revealed that in the sub-source categories Public Electricity and Heat Production and Manufacturing Industries and Construction the changes (primarily decreases) in the CO_2 implied emission factor (IEF) for other fuels in the period 1990–1994 are identified as outliers among reporting Parties. Germany explained that during the period 1990–1994 residues from lignite processing, namely the tar and gas produced, were burned as waste in the new Länder. This resulted in a much higher EF for CO_2 compared to that of municipal waste. The amount of tar-rich residues used as fuel in two plants decreased from 1990 to 1991 and their use was abandoned after 1994. Any fluctuations recorded in the period 1990–1994 are due to the use of weighted EFs for municipal waste and residues. The ERT recommends that Germany include this explanation in the NIR in order to improve clarity.

47. The 9.3 per cent increase in the CO_2 IEF for solid fuels in petroleum refining between 1990 and 2002 has also been identified as an outlier. In addition, the IEF is subject to substantial inter-annual variations – primarily decreases in the period 1990–1993 and increases thereafter, with a prominent jump (+125.4 per cent) between 1995 and 1996. Germany explained that the increase in the IEF over the years is due to a continuous decline in the use of gas in refineries and an increase in the share of crude lignite – from 77 per cent in 1990 to 84 per cent in 2000 – with the accompanying higher EF (>110 t/TJ). The reconnection of a power plant using large amounts of crude lignite at one petroleum refinery from 1995 to 1996 is responsible for the large increase of the corresponding IEF. The ERT recommends that Germany include this explanation in the NIR in the next round of reporting to improve clarity.

Manufacturing industries and construction: all fuels – CO_2

48. Activity data, IEFs and emissions for CO_2 are reported by fuel but not by sub-source category in the CRF. However, the sub-source categories 1.A.2.a Iron and Steel, 1.A.2.d Pulp, Paper and Print and 1.A.2.f Other Electricity Producers are discussed in the NIR. All sub-source categories are reported as "IE" with no further explanation in the CRF tables. Moreover, data on iron and steel industries, anticipated to be included under Industrial Processes (table 2(I)), are noted there as "NE". During the in-country visit, Germany explained that data related to fuel combustion in iron and steel operations are indeed included in the Energy sector under Manufacturing Industries and Construction. The current national approach used in the NIR is based on the national energy balance, which does not enable a distinction to be made between energy and process-related emissions. A new approach, corresponding to an IPCC tier 2 method, is under development based on data from the Federal Statistical Office and relevant companies. This approach will enable sub-source disaggregation and will most likely be applied in the 2006 submission. Germany is strongly encouraged to implement the new approach in its inventory activities as soon as possible. Notation keys should be corrected accordingly.

49. Fuel consumption in manufacturing industries and construction decreased by 27.3 per cent during the period 1990–2002. The reductions detected in the period 1990–1993 are identified as outliers. During the in-country review Germany specified that such changes are attributed to the closure of plants in the new Länder during the period 1990–1994. It was also further specified that fuel consumption has not exhibited significant decline since 1994, but increased energy efficiency has led to lower emissions over the years. The ERT noted that the NIR does not include any discussion on this development in the respective section in the NIR, and encourages Germany to include this element in future submissions in order to improve transparency.

Civil aviation: liquid fuels – CO_2

50. The 2002 value of the CO_2 IEF (74.00 t/TJ) for jet kerosene for civil aviation has been identified as an outlier, as it appears to be the highest among reporting Parties (the range is from 47.23 to 74.00 t/TJ) and is higher than the IPCC default value (72.80 t/TJ). The same value is applied for the

entire time series 1990–2002. Germany recognizes that the calorific value used for kerosene is not reasonable and needs to be corrected. The ERT recommends that this correction be made in the next submission. Furthermore, data for aviation gasoline are noted as "IE" for all gases in the CRF tables, followed by an explanation in the respective documentation box. Germany should include this explanation both in table 9 Completeness and in the NIR.

Road transportation: liquid fuels – N_2O

51. The large increase (31.3 per cent) in the N_2O IEF for gasoline for road transportation between 1990 and 1991 has been identified as an outlier, while the 1995 value of the N_2O IEF (10.86 t/TJ) is one of the highest among reporting Parties. Germany explained that the increase detected in the early 1990s is due to the increasing number of cars with catalytic converters and that this trend lasted up to 1997. The Party admits that the country-specific EFs for gasoline are generally too high and they will be corrected. The ERT welcomes such improvement and encourages Germany to include discussion on these trend features in the NIR.

Other sectors: solid, liquid and gaseous fuels – CO_2

52. The 4.7 per cent increase in the CO_2 IEF for solid fuels for other sectors between 1990 and 2002 and several intervening fluctuations were identified as outliers. Germany explained that data from 1990 to 1994 have to be adapted to the new methodology applied for 1995 onwards. Furthermore, Germany attributed the fluctuations to the predominance of brown coal briquettes in the early 1990s, a pronounced decrease in their use in the following years up to about 1995, and the considerable increase of the share of coking coal coke and other coking coal products with a higher EF in the period 1996–2000. With regard to the sub-source category Agriculture/Forestry/Fisheries, Germany attributes the outliers detected to the use of different fuels or different EFs for different regions over time, and acknowledges the need for improvement. The ERT encourages Germany to apply the new approach to the entire time series and include the reasons for this development in the NIR.

Fugitive emissions: solid and liquid fuels – CH_4

53. During the in-country visit Germany mentioned that fugitive emissions occur during the transport of imported coal but they are not currently accounted for in the submission. It is recommended that these emissions be reported in the CRFs under the sub-source category 1.B.1.c Other with the appropriate specification both in the CRF and in the NIR.

54. In the case of liquid fuels, Germany explained that the large decrease in CH_4 emissions detected in the period 1990–2002 (62.2 per cent) was due to technical improvements in refineries following the implementation of regulations on the control of emissions. During the in-country visit Germany indicated that the figure for CH_4 emissions for 2002 (4.1 Gg) is incorrect as it refers to exploration only. The complete CH_4 emissions for the source 1.B.2.a Oil amount to 6.5 Gg. Furthermore, Germany informed the ERT that, although CH_4 emissions from venting and flaring are reported as "NE", they are nevertheless included in CRF table 1.B.2.a(i), (iv) and (v) and in 1.B.2.b. Germany should correct the error and use the notation key "IE" instead of "NE" in the data cells for Venting and Flaring. However, efforts should be made to differentiate the data according to the CRF format. The German experts stated that this is most likely to happen in 2006 in connection with the work on implementation of the European Emissions Trading Directive.

55. Data on the production, transport and distribution of oil products are not estimated. Germany is encouraged to make efforts to report data on the missing oil operations, employ any reliable new EFs and improve the documentation of data features in the NIR.

D. Non-key sources

Fuel combustion: solid – N_2O

56. The increase of the N_2O IEF for solid fuels for Energy Industries by 10.0 per cent between 1990 and 2002 was identified as an outlier. Germany explained that this is most likely due to an EF that was

too low in the period 1990–1994, especially for hard coal (and for brown coal, although of less relevance), and an EF that was probably too high for hard coal in 2000. Germany stated that the N_2O EF for the period 1990–2002 will be updated through a research project.

Manufacturing industries and construction: all fuels – CH_4 and N_2O

57. Activity data, IEFs and emissions of CH_4 and N_2O are not reported because an inadequate methodology hampers sub-source category disaggregation. As described in the corresponding section under key sources, Germany is developing a new approach which will resolve this problem in future submissions.

Transport: liquid fuels – CH_4

58. The CH_4 IEF for gasoline for Road Transport is found to have decreased remarkably (by 78.8 per cent) between 1990 and 2002. Germany explained that this is primarily due to the setting of stricter and stricter limits for hydrocarbon emissions for passenger cars (EURO I and EURO II) and the increase in the share of passenger cars with catalytic converters over the years (e.g., 90 per cent in 2002 in contrast to 20 per cent in 1990). The decrease detected in the period 1990–1993 is due to the phasing out of cars with two-stroke engines in the new Länder. It is recommended that Germany include such explanations in the NIR.

Railways: solid fuels – CO_2

59. Fluctuations recorded in the CO_2 IEF for solid fuels for Railways have been identified as outliers. Germany explained that this is due to inter-annual variations in the share of hard coal and lignite (drawn from the official energy balances) used historically for rail transport. It is recommended that this issue be better explained in future NIRs.

Navigation: liquid fuels – CO_2

60. Emissions of CO_2 from domestic navigation decreased by 64.0 per cent between 1990 and 2002. Germany attributes this to the decline in the AD alone, since a constant EF for diesel oil (the only fuel used in domestic navigation) is used for the entire time series. However, the decrease in the AD cannot be explained by the decrease in the number of cargo ships alone during the same period (about 28 per cent between 1990 and 2002). National experts suspect that this may be due to the fact that AD are based on sales of marine fuel; as about 75 per cent of inland navigation takes place on the River Rhine and the western inland channels, it is most likely that most bunker fuel combusted is bought at the nearby port of Rotterdam where prices are lower. During the in-country review Germany stated that emissions from passenger and fishing vessels are not included in the inventory because they are considered to be negligible. The ERT encourages Germany to explain the trends observed clearly in the NIR along with the appropriate documentation. The issue of emissions from passenger and fishing vessels should also be addressed and documented both in the CRF tables and in the NIR.

Fugitive emissions: solid and liquid fuels – CO_2

61. Fugitive emissions of CO_2 have not been estimated in the German inventory. In the case of emissions from coal mining, the NIR states that the ongoing project on CH_4 emissions from coal mining will investigate whether available data can be used as a basis for determining both CO_2 and N_2O emissions. The ERT recognizes that these releases may turn out to be rather significant and recommends that such efforts should also cover corresponding emissions from oil and gas operations.

E. Areas for further improvement

Identified by the Party

62. Germany is fully aware of all major areas that require improvements in the energy-related inventory activities. These include:

(a) Establishing an effective system for the timely preparation of the national energy balances;

(b) Incorporating feedstocks correctly in the calculations;

(c) Revising N_2O EFs in fuel combustion activities for the years 1990–1994 and incorporating the already revised CH_4 EFs in the inventory;

(d) Performing and reporting recalculations for the entire series;

(e) Adopting a new approach to enable distinction between energy - and process-related emissions in the Manufacturing Industries and Construction sector;

(f) Conducting constant revisions of the EFs in the Transport sector; and

(g) Finalizing and implementing the planned national QA/QC plan.

63. Germany has concrete plans for all the above.

Identified by the ERT

64. The ERT wishes to emphasize once more the importance of timely preparation of the national energy balances, and encourages the allocation of all necessary resources to achieve this vital improvement. Major deficiencies in the German inventory, such as missing data in the reference approach and feedstocks, should then be resolved. In addition to the areas identified by the Party, the ERT recommends that efforts be made to improve consistency between the information provided in the NIR and in the CRF tables. Germany is also strongly encouraged to continue its efforts to resolve data problems caused by reunification. The detailed discussion on the CO_2 EFs presented in the NIR should be supplemented with a discussion of the EFs for CH_4 and N_2O. A discussion of particular source category trend features could also be included in the NIR to improve transparency. Finally, notation keys should be properly entered in the CRF tables, accompanied by appropriate explanations at the required places.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

65. In the year 2002 the Industrial Processes sector accounted for 4.2 per cent of total national GHG emissions and Solvent and Other Product Use for 0.2 per cent. Emissions from industrial processes have decreased by 28.7 per cent since 1990, mainly as a result of abatement measures in adipic acid production. Germany reports in the NIR that CO_2 emissions from iron and steel production have remained relatively constant, but the ERT was not able to validate this because emissions from iron and steel are not given separately in the CRF tables. Germany reports in the NIR that emissions of CO_2 from lime and cement manufacturing have been relatively constant. The ERT noted that these emissions have a fluctuating trend, and that emissions from cement production decreased by 18.4 per cent from 1990 to 2002, and emissions from lime production have decreased by 13.5 per cent. The ERT recommends that Germany be more precise in its description of trends.

Completeness

66. The CRF includes estimates of most gases and sources of emissions from the Industrial Processes sector, as recommended by the IPCC Guidelines. Not included are limestone and dolomite use, soda ash use, asphalt roofing (only AD provided), road paving with asphalt, production of silicon carbide, carbon black, ethylene, dichloroethylene, styrene and methanol, food and drink production and ferroalloys production. In addition, there are some emission sources for which an emissions estimate is given in the CRF but which are not described in the NIR (soda ash production, glass manufacture, and food and drink). The ERT concludes that the inventory of industrial processes in Germany is mostly but not entirely complete, and Germany is encouraged to estimate the missing emission sources and give more information on its methods of estimating emissions in the NIR.

B. Key sources

Cement production – CO_2

67. Cement production accounted for 29.0 per cent of emissions from the Industrial Processes sector in 2002. Emissions have decreased by 18.4 per cent since 1990 due to decreased activity. The ERT encourages Germany to describe the trend fluctuations in the NIR.

68. Germany uses a country-specific method that is described as corresponding to tier 2 but there is no detailed description in the NIR. To increase transparency the ERT encourages Germany to give a more detailed explanation of the country-specific method and how it differs from the IPCC method.

69. Activity data used are based on voluntary reporting to the German Cement Works Association. The ERT recommends that Germany to try to establish permanent (or institutionalized) data collection procedures.

70. There are gaps in the data between 1991 and 1993, but the ERT noted that Germany is trying to fill these gaps to ensure time-series consistency. This is strongly encouraged.

71. The IEF (0.53 t/t clinker for the whole time series) has changed since the previous submission (0.57 t/t clinker for the whole time series), but no explanation is given. The ERT encourages Germany to explain the change to the IEF in the NIR.

Lime production – CO_2

72. Emissions from lime production account for 13.0 per cent of emissions from industrial processes in Germany. Emissions show a fluctuating trend and were 13.5 per cent lower in 2002 than in 1990. The ERT encourages the Party to give more information on the trend fluctuations in the NIR.

73. The NIR states that a country-specific method is used to estimate emissions. There are some inconsistencies in the EFs given in the NIR and the CRF and it is not clear which is the correct one. The ERT recommends that the explanation of methods and EFs used be clarified and consistency between the NIR and CRF enhanced.

74. The NIR states that emissions from dolomite burnt are excluded because they are estimated to represent only a small share of lime production. The ERT noted that the Party plans to estimate the significance of this source, and this is strongly recommended.

75. Emissions from lime production of other sectors of industry (non-marketed lime) are not estimated in the inventory. The ERT encourages the Party to increase the completeness of the inventory by including these sources in the estimates of emissions from lime production.

Nitric acid production – N_2O

76. Nitric acid production is identified as a key source by the Party but not by the secretariat. Emissions have decreased by 14.3 per cent since 1990.

77. It is somewhat unclear how emissions have been estimated in Germany and which part of the NIR presents emissions estimation methods in general. The ERT recommends that Germany should follow more closely the structure of the NIR given in the UNFCCC reporting guidelines and be very precise about which piece of text goes to which particular section. It is especially important to differentiate between general discussion, methods used, uncertainty estimates and planned improvements.

78. There are six different plants that produce nitric acid in Germany, and they have different emission abatement techniques. Germany uses the same EF for all the plants. Because this is a key source, plant-specific EFs which take into account different production and emissions abatement technologies should be used. The ERT was informed that Germany is to get data from different plant types about abatement techniques in order to be able to use more detailed EFs. The ERT encourages this.

79. Activity data for nitric acid production have previously been provided by the Federal Statistics Office, but since 2002 only an aggregated figure covering both nitric acid and nitrating acids has been provided. The amount of nitric acid produced is estimated using the share in previous years. The ERT noted that Germany will try to get disaggregated data from the Federal Statistics Office or start collecting data from the plants directly, and this is strongly recommended. The ERT also noted that Germany will examine whether non-marketed nitric acid is included in the figure given by the the Federal Statistics Office. The ERT encourages Germany to continue this work.

Adipic acid production – N_2O

80. Adipic acid production is a key source because of its strongly decreasing trend (83.7 per cent since 1990). The reductions in emissions are due to voluntary measures taken by plants. In the previous NIRs no explanation for this source category was given, but in the 2004 NIR the emission source is adequately explained. Emission estimates provided directly by the plants are confidential.

Primary aluminium production – PFCs

81. Primary aluminium production was identified as a key category by the Party but not by the secretariat. Emissions have decreased by 82.7 per cent since 1990 as a result of modernization measures in German aluminum foundries and to decommissioning of production capacities. Germany uses a tier 3a method with detailed data from companies. Some order of magnitude errors (kg/t versus t/t) were found in the CRF tables, and the ERT noted that Germany is to correct the errors in its next submission. Emissions are not estimated for 1990–1994. Estimation of these emissions is recommended.

SF_6 used in aluminum and magnesium foundries – SF_6

82. This category is identified as a key category by the Party but not by the secretariat. Emissions from this source have increased by 409.4 per cent since 1990. There are some typographic errors in the IEFs given in the CRF tables that do not affect the emissions estimates. The ERT recommends that Germany correct the errors.

Production of HFCF-22 – HFC-23

83. HCFC-22 production is a key source because of its decreasing trend. The NIR states that Germany uses the tier 1 method. The ERT understands that the Party uses a country-specific method using plant-specific data for the latest years (2001–2002). Emissions for 1990–1994 are not estimated. The ERT recommends that Germany also use the country-specific method for calculating previous years' emissions, estimate emissions in 1990–1994, and clarify the description of methods used for the whole time series.

Consumption of halocarbons and SF_6 (ODS substitutes) – HFCs, PFCs and SF_6

84. The Party reports all sub-source categories under Consumption of Halocarbons and SF_6 to be key sources. The ERT noted that the only significant sub-source is refrigeration and air conditioning equipment. In addition, there are some sub-sources (e.g., foam blowing) where an increase in emissions is expected and it is therefore important to treat this as a key category. If resources are limited, it may not be necessary to treat the other categories as key categories. For refrigeration and air conditioning, more detailed information about the country-specific values used could be given in the NIR.

85. In the CRF tables notation keys "not occurring" ("NO") and "NE" are used for some potential emissions whereas actual emissions are estimated. Germany is encouraged to estimate potential emissions as well or give explanations for the notation keys.

86. In many sub-sources, new sources of fluorinated gases (F-gases) have been identified during recent years, or surveys have been improved, which leads to inconsistencies in the time series. For semiconductors, voluntary reporting for producers started in 2001; for electrical equipment, data were collected but only from the largest producers until 2001; and in airborne warning and control systems, surveys performed in 1996 and

2001 showed large differences. Germany is trying to get more data from the previous years as well to improve time-series consistency, which is recommended also by the ERT.

C. Non-key sources

Mineral products – CO_2

87. Germany has estimated emissions from soda ash production and glass production, but no description of the method, the EFs or the AD used is given in the NIR. Germany should improve transparency by adding this information in its future submissions.

88. Germany has not estimated emissions from limestone and dolomite use, soda ash use, asphalt roofing and road paving with asphalt. In explanation, Germany stated during previous review stages that emissions from limestone and dolomite use cannot be estimated because of lack of AD and a method (EF). However, there is a method available in the IPCC Guidelines. The ERT recommends that Germany collect the data and estimate these emissions.

Ammonia production – CO_2

89. Emissions from ammonia production are estimated using an EF that is lower than the IPCC default and the lowest of all reporting Parties, and is not well documented. The ERT noted that Germany has planned to begin using the IPCC default value in future, which is recommended.

Silicon carbide production – CO_2 and CH_4

90. Emissions from silicon carbide production have not been estimated in Germany, even though a method is available in the IPCC Guidelines. The ERT encourages Germany to estimate these emissions.

Chemical industry: Other – CO_2, CH_4, N_2O

91. In the NIR, Germany reports AD and EFs for ethylene and styrene production, and describes a calculation method (multiplication of the numbers). In the CRF the notation key "NE" is used. However, during the review the ERT was given estimates of emissions. The ERT encourages Germany to improve the consistency of information as between the NIR and the CRF and include estimates of emissions in the CRF tables.

92. Germany has not estimated emissions from the production of carbon black, dichloroethylene or methanol in the NIR. It reports AD for carbon black in the CRF, and IPCC default EFs for CH_4 emissions from methanol and dichloroethylene. During the review the ERT was given estimates of emissions. Germany is encouraged to include estimates of these emissions in the CRF tables.

Iron and steel production – CO_2

93. Germany provides information on the calculation method for iron and steel production in the NIR. The method is from the IPCC Guidelines and is not considered good practice according to the IPCC good practice guidance. The ERT was informed that the method described in the NIR was not in fact used in calculating the emissions. Emissions are reported as "NE" in tables 2(I)s1 and 2(I).A-Gs2. In the Energy sector table1.A(a)s2 the notation key "IE" is used for the category Iron and Steel. It is not very transparent how these emissions are included in the inventory, even though the Party explained and demonstrated in the "Zentrales System Emissionen (ZSE)" that they are included in emission totals in Manufacturing Industries and Construction in the Energy sector. Germany should make the matter very clear in its next submission, and also report process emissions separately from energy-related emissions in accordance with the IPCC good practice guidance. Germany stated that it is planning to do so for the 2006 submission.

Solvent and other product use – N_2O

94. In the Solvent and Other Product Use category, emissions are constant over the whole time series because the same emission estimate has been used from the only GHG source (use of N_2O for

anaesthesia) in this sector. The ERT was informed that Germany is to revise the time series, and this is strongly recommended.

IV. AGRICULTURE

A. Sector overview

95. In the year 2002 the Agriculture sector accounted for 8.7 per cent of total national GHG emissions, reaching 88,299 Gg CO_2 equivalent. Over the period 1990–2002, emissions in this sector decreased by 19.7 per cent. In 2002 CH_4 emissions contributed 60.4 per cent to total agricultural CO_2 equivalent emissions and N_2O accounted for the remaining 39.6 per cent. Manure management, agricultural soils and enteric fermentation were the major agricultural source categories, contributing 34.4 per cent, 35.5 per cent and 30.1 per cent, respectively. Source categories 4.C Rice Cultivation and 4.E Prescribed Burning of Savannas do not occur and 4.F Field Burning of Crop Residues is prohibited in Germany.

96. From 1990 to 2002, GHG emissions from manure management and enteric fermentation decreased by 20.1 and 21.8 per cent, respectively, because of a reduction in the exporting of meat from the new Länder and hence a decrease in the livestock population (by 28.4, 23.4 and 16.3 per cent for dairy cattle, non-dairy cattle and swine, respectively). Emissions from agricultural soils declined by 17.2 per cent. The reason for this was a decrease in agricultural land area during the period 1990–2002, by 1,058,000 ha (5.9 per cent), and a constant decline in nitrogen (N) supplied by mineral fertilizers (17.3 per cent) and animal waste N returned to soils (15.3 per cent). The ERT encourages Germany to provide relevant explanations on the trends in the NIR.

97. In the key source analysis carried out by Germany, enteric fermentation of dairy and non-dairy cattle, CH_4 emissions from manure management of dairy cattle, non-dairy cattle and swine, and direct and indirect N_2O emissions from agricultural soils are identified as key sources on level assessment. Enteric fermentation of non-dairy cattle is a key source on the trend analysis reported by Germany. In the secretariat's analysis manure management (CH_4), enteric fermentation and direct N_2O emissions from agricultural soils have been identified by level assessment. The results of the different key source analyses are in good agreement taking into consideration that Germany used a more detailed level of disaggregation for sub-sources of enteric fermentation and manure management which is in line with the IPCC good practice guidance.

Completeness

98. The CRF includes estimates of all gases and sources of emissions from the Agriculture sector, as recommended by the IPCC Guidelines. In addition to the IPCC Guidelines gases, Germany has reported non-methane volatile organic compounds (NMVOCs) from livestock manure management and agricultural plants. Additional to the IPCC Guidelines, indirect emissions of N_2O due to volatilization of ammonia (NH_3) and nitrogen oxide (NO_X) compounds from manure management are included under the subcategory Indirect N_2O Emissions from Agricultural Soils. Germany reports CH_4 deposition from agricultural soils for which a methodology is not included in the IPCC Guidelines.

99. GHG emissions from enteric fermentation and manure management of goats, mules and asses are not reported. The number of horses is actually twice as high as the figure in the official statistics, and emissions from horses are thus underestimated by 50 per cent. Germany is encouraged to calculate these emissions for the period 1990–2002 in its next submission. CO_2 emissions are reported as "IE" and included under the Land-use Change and Forestry (LUCF) sector. Germany has completed the relevant Agriculture tables of the CRF for the period 1990–2002 (4.A, 4.B(a), 4.B(b), and 4.D). Tables 4.C (Rice Cultivation), 4.E (Prescribed Burning of Savannas) and 4.F (Field Burning of Crop Residues) have been filled in with the notation key "NO". The CRF tables are filled in completely. Notation keys are properly used in the CRF tables throughout the whole time series. The ERT recommends that Germany report enteric fermentation from poultry in category 4.A as "not applicable" ("NA") rather than "NO" (which it has used) because this type of animal is present in the country but only accounts for negligible amounts of methane from enteric fermentation. The information in the NIR is complete.

Transparency

100. The Agriculture chapter of the NIR provides overall information on methodology, AD, EFs and references for every source category. In the CRF information is presented in the tables, footnotes and additional information boxes. However, it is unclear from the NIR how the actual calculations were performed. During the review the German Federal Agricultural Research Centre (FAL) provided comprehensive documentation of the methods used in the German inventory (with complete cross-references in the text) and a comprehensive emissions inventory, which increased transparency. The ERT recommends that Germany expand the relevant explanations of the calculation processes in the NIR and the CRF tables and consider the possibility of using a sample district in an appendix to the NIR of the 2006 submission or in the documentation boxes of the CRF to give greater transparency to the calculation process.

101. Activity data are collected from the animal census data obtained in December of every even year from 1990 onwards and from 1999 onwards in May of every odd year. The basis for the statistics is the German districts. For all years in between, animal data have been supplied by the German Statistical Office based on incomplete census data. Land-use data for districts are available for every fourth year; however, data are provided for the Länder annually. The ERT encourages Germany to provide information on the collection of AD in a transparent manner in the NIR. The methodology used is a combination of the IPCC Guidelines, CORINAIR and a country-specific methodology. The emission factors used are country-specific, default and EMEP/CORINAIR. The technical references indicated for the country-specific methodology (CH_4 emissions and N excretion of dairy cattle) are published without a peer-review process and are in German. The ERT encourages the Party to provide summary information on the methodologies used for these investigations in the NIR. Germany may wish to publish surveys in a scientific journal with an appropriate peer review process and submit its country-specific EFs to the IPCC Emission Factor Database (EFDB).

Recalculations and time-series consistency

102. Emissions from animals have been recalculated as a result of the inclusion of animal populations in the city-districts of Bremen, Berlin and Hamburg. Enteric fermentation of dairy cows has been recalculated due to the development of a country-specific EF. The MCF for liquid storage of manure has been revised in accordance with the IPCC good practice guidance. N_2O emissions from every source have been recalculated using a mass-flow approach. N_2O emissions from agricultural soils have been recalculated because the default EF of the CORINAIR manual has been revised. CH_4 deposition by agricultural soils was recalculated due to differentiation of EFs by sinks. All recalculations have been performed throughout the whole time series and are fully consistent. NMVOC emissions have been estimated for the first time. Germany is encouraged to provide relevant information on recalculations in table 8 of the CRF.

103. Section 6.1.2.3 of the NIR considers the time series to be inconsistent, but section 6.1.1.3.1 indicates that the time series is consistent. Germany explained that the time series is inconsistent in principle because of the changes in census taking; however, these inconsistencies in practice are only worth considering for sheep and horses. Since 1999 the sheep population has increased by 10.6 per cent and the horse population has decreased – by 40.3 per cent. The number of horses has been underestimated and is actually twice as high as the figure given in the official statistics. The animal population data reported in the 2004 CRF differ from those reported in previous submissions for all animals. No explanation is provided. The ERT encourages Germany to resolve the problem with the consistency of its animal population data and supply relevant information.

Uncertainties

104. Uncertainty is estimated for all source categories in the sector. In most cases expert judgement has been used. An uncertainty analysis performed in accordance with the IPCC good practice guidance has not been done. Germany will develop uncertainty estimates made by an independent organization using agricultural expert knowledge. The ERT encourages this work.

B. Key sources

Enteric fermentation – CH_4

105. The NIR indicates that the country-specific method used leads to underestimation of CH_4 emissions from enteric fermentation of dairy cows. The category Other Cattle was estimated using the simplest CORINAIR method, which corresponds to the IPCC tier 1 approach. This is not consistent with the recommendations of the IPCC good practice guidance for key sources. Germany is to implement a tier 2 approach for all ruminants in its 2006 submission. The ERT encourages this work.

106. The value of the CH_4 IEF (73.49 kg/head/year) for non-dairy cattle is the second-highest of reporting Parties and is higher than the IPCC default value for Western Europe. Germany explained that the values of 84 kg/head/year for male and female beef cattle and 33 kg/head/year for calves were obtained on the basis of IPCC assumptions using national data on live weight of slaughter animals. The subcategory Suckling Cows is included under Non-Dairy Cattle. Germany may wish to report emissions from suckling cows in the Dairy Cattle category. The ERT recommends that Germany provide relevant explanations on the assumptions used for the derivation of EFs in the NIR.

Manure management – CH_4

107. The NIR reports that a tier 1 method is used for calculating emissions from dairy cattle. However, in CRF table 4.B(a) data on mass, volatile solids (VS) and methane-producing capacity (B_o) used for tier 2 estimations are included. From the comments of Germany it follows that in estimations the IPCC default VS excretions (tier 1) were combined with actual German animal waste management systems (AWMS) frequency distributions (tier 2). The ERT encourages Germany to report in a transparent manner which method is used for calculations. The simplest CORINAIR method was applied for the categories Other Cattle and Swine, although they are a key source. This is not in line with the IPCC good practice guidance. Germany explained that tier 2 will be implemented for dairy and non-dairy cattle in the 2006 submission. However, it is unclear whether tier 2 will be used for swine as well in the 2006 submission. The ERT encourages Germany to continue this work. The CH_4 IEF for dairy cattle, non-dairy cattle and swine has been identified as the highest among reporting Parties. According to the comments provided by Germany, a transcription error was identified, and back calculations will be performed accordingly for the next NIR. The NIR indicates that the figures on the split of AWMS were modelled on a basis which is considered to be inadequate. The data were transferred from representative regions to all districts. The Party is undertaking a test study to examine how the real data differ from the modelled data. The ERT encourages this investigation.

Agricultural soils, direct emissions – N_2O

108. The N_2O emissions from cultivation of histosols are reported in Tg instead of Gg. This leads to underestimation of direct N_2O emission from soils. The ERT recommends that this value be corrected in the next submission. For crop residues a country-specific method is used; however, a fixed value is used for all years and it does not depend on the productivity of crops, as it would under the default method. According to the comments of the Party, the standard amount of crop residues is taken from standard German literature (Musterverwaltungsvorschrift). Germany is to reconsider the method used for crop residues in the future. The ERT encourages this work.

C. Non-key sources

Manure management – N_2O

109. The N excretion rates reported for non-dairy cattle are lower than those proposed by the IPCC Guidelines. In response to a comment on this, Germany stated that data are obtained from the authoritative German source (Musterverwaltungsvorschrift). This database is being checked at present and will be replaced by more recent findings. The ERT encourages this work. Values for N excretion per AWMS reported in table 4.B(b), ranging from 42.3 to 130.6 kg N/year, are low compared with those reported by other Parties. No explanations are provided in the NIR. The value for N excretion from

pasture, range and paddock in table 4.B(b) differs from the value for animal production in table 4.D. In CRF table 4s2, Other is related to animal species instead of different AWMS. No explanation is provided in table 4.B(a) or the NIR. In table 4.B(b) Additional Information, the IEF for N_2O from liquid system and solid storage and dry lot AWMS are reported as "NE", while these values are indicated in the NIR and are actually used in the calculations. The ERT encourages Germany to harmonize the reporting in the CRF with the NIR in its next submission.

D. Areas for further improvement

Identified by the Party

110. Data for a tier 2 method for enteric fermentation of ruminants as well as information dairy-cow rations, types of stable, storage procedures and spreading methods are to be collected by means of surveys and calculations will be performed for the 2006 submission. The mass-flow approach used to calculate emissions of N species needs to be updated in the area of oxidized species.

Identified by the ERT

111. The ERT acknowledges and encourages the further work of the inventory team on issues identified by the Party. It recommends that Germany include all relevant explanations of the issues identified in this review in the NIR and CRF of its next submission.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

112. The LUCF sector in Germany is a net source of CO_2 emissions for Germany, mainly because of large emissions from the cultivation of organic soils. In previous years Germany has reported net removals from the LUCF sector. For the first time, Germany in its 2004 submission includes emissions from cultivation of organic soils and liming of agricultural soils, which changes the previous net removals to net emissions. The LUCF category is a small source of CO_2 in Germany, ranging from 0.6 to 1.6 per cent of total CO_2 emissions (without LUCF). Subcategory 5.A Changes in Forest and Other Woody Biomass Stocks accounts for all net CO_2 removals – in the range of 25,402 to 33,689 Gg CO_2 – and is regarded as an important part of the inventory in the LUCF category.

113. Net CO_2 removals from source category 5.A showed a large decrease between 1999 and 2000 (from 33,400 to 25,402 Gg CO_2). This large reduction in net removals was due to a large increase in wood harvest due to damages from a windstorm and consequent increases in the release of CO_2.

114. The important source of CO_2 emissions within the LUCF category is subcategory 5.D CO_2 Emissions and Removals from Soils, which accounts for CO_2 emissions in the range of 39,053–41,204 Gg CO_2 with low inter-annual changes.

Completeness

115. The 2002 CRF includes only estimates of CO_2 emissions/removals under LUCF. The lack of completeness can be traced to the following: emissions of non-CO_2 gases are reported as "NE" in CRF table 5, but are reported in sectoral table 5.B as "NO". Emissions estimates are not reported for categories 5.B Forest and Grassland Conversion and 5.C Abandonment of Managed Land, but the notation keys "NE" and "NO" are used in the CRF. The estimates for 5.D CO_2 Emissions and Removals from Soils are reported only for cultivation of organic agricultural soils and for liming of agricultural and forest soils.

Transparency

116. The data submitted for 2002 and the associated information in the NIR are transparent for the understanding of the reporting categories. The LUCF sectoral report table 5 is used correctly, taking into account the background data in table 5.A. This is not so in the case of the data in table 5.D. Detailed

information about LUCF activities is documented in the NIR, which clearly explains the methodology, the application of AD and the calculations.

Methodologies, EFs and AD

117. The methodology follows the IPCC Guidelines, mostly using a tier 2 approach, and the emission/removals calculations are appropriate for the LUCF sector.

118. In most cases country-specific EFs for temperate forests have been used. In source categories 5.A and 5.D, country-specific data for biomass increment, conversion ratios, wood densities and carbon loss from cultivation of organic soils have been used. All these country-specific data are derived from national studies. The implied carbon conversion factor for CO_2 emissions from liming is four times higher than the IPCC default value and should be verified for the next submission.

119. All AD in the LUCF sector are based on national statistics. Statistical data for forestry originate from the Federal Forest Inventory for the old federal Länder (BWI I), and from Datenspeicher Forestfonds (the Forest Management Database) for the new Länder. Timber harvest data are taken from felling statistics elaborated at the Länder level. Data from the main survey of soil use (Bodennutzungshaupterhebung) are used to determine land use. Complete surveys are conducted every four years. Several additional systems exist (a cadastre system, a CORINE land-use map, etc.) and could be used to obtain better estimates of land-use changes in future submissions. The AD are appropriate and suitable for use with the IPCC methodology.

Recalculations and time-series consistency

120. In the 2002 submission, no data have been recalculated in the LUCF category. The net CO_2 emissions/removals from LUCF showed a large decrease between 1999 and 2000, and this is explained in the NIR. The CO_2 emissions in subcategory 5.D CO_2 Emissions and Removals from Soils are consistent over the period 1990–2002.

B. Sink and source categories

Changes in forest and other woody biomass stocks – CO_2

121. Emissions and removals of CO_2 are reported for temperate forests. Reported average annual growth rates in 2002 ranged from 4.0 m^3/ha/yr for other deciduous trees with a low rotation period to 11.4 m^3/ha/yr for coniferous forests. The growth rates used for German temperate forests are above the IPCC default values for the respective forest types, but they are determined from the national yield tables with consideration given to the age class structure, tree species composition and site conditions of German forests. The NIR gives detailed information about the forest area per tree species, current growth rates per tree species, and expansion factors and wood bulk densities.

122. Due to lack of data for changes in forest land area and annual variations in biomass uptake, a constant value of 79,375 Gg CO_2 removals is reported over the period 1990–2002. Data for woody biomass harvest for temperate forests are reported as a constant value (45,686 Gg) for the years 1990–1994, a constant value (45,975 Gg) for the years 1995–1999, and a constant value (53,973 Gg) for the years 2000–2002. The reasons for using these average values are explained in the NIR. Timber harvest data are taken from felling statistics, but due to some inconsistencies (different periods, different categories) at the Länder level the average data (for 1990–1994, 1995–1999 and 2000–2002) have been used. The large increase of wood harvest between the periods 1995–1999 and 2000–2002 is due to a major hurricane in December 1999. Most of the damaged trees were processed in 2000 and thus were included in the felling statistics for the next years.

Forest and grassland conversion – CO_2, non CO_2 gases (CH_4, N_2O)

123. CO_2 emissions are reported as "NE". Emissions of non-CO_2 gases are reported as "NE" in CRF table 5 but as "NO" in sectoral table 5.B. Because AD from some national sources indicate annual

changes in area of land use categories (agriculture and forest lands) of several thousands hectares, it would be appropriate to account for these in the inventory calculations for future submissions.

Abandonment of managed lands – CO_2

124. CO_2 emissions/removals are reported as "NE" for this category. According to the information in the NIR they are not estimated due to lack of AD for land use and land-use change, and inadequacies in such data are the most difficult obstacles faced by GHG reporting for this category. The landscape structure within Germany indicates that the category Abandoned Land rarely occurs and is not important for the GHG calculations.

CO_2 emissions and removals from soils – CO_2

125. There are two activities covered in this source category, namely the cultivation of organic agricultural soils and the liming of agricultural and forest soils. Annual CO_2 emissions for the whole category fluctuated slightly within the range 39,052 Gg to 41,204 Gg over the period 1990–2002. The variations in emissions are caused by changes in AD (changes in areas of cultivated land and changes in amounts of liming). The implied EFs for the average annual rate of soil carbon uptake/removal are 5 Mg C/ha/yr for grasslands and 11 Mg C/ha/yr for croplands (cultivation of organic soils), which are higher than the IPCC default values. Emission factors are country-specific and based on several national studies.

126. Inconsistent figures for carbon emissions from liming (in Mg C in table 5.D) and for CO_2 emissions from liming (in Gg CO_2 in table 5) are reported. The ERT recommends that Germany correct this for its next submission.

127. The soil carbon changes in mineral soils due to large land-use changes in Germany during previous decades, especially between agricultural and forest lands, should also be included in calculations in future.

C. Areas for further improvement

Identified by the Party

128. The Party recognizes the need to improve various aspects related to better calculations in line with the IPCC guidelines and to achieve better reporting of sectoral data following the UNFCCC reporting guidelines. Discussions during the review showed that improvements in the inventory process for the LUCF sector will be possible in the near future, in particular as regards better estimates of land-use change.

Identified by the ERT

129. The reported results of inventory calculations are correct in general, but some improvements of transparency in reporting and completeness of the data should be carried out for future submissions. The following points may be considered in efforts to bring about these improvements:

(a) Gaps identified in the German inventory, such as missing estimates for source categories 5.B and 5.D (soil carbon changes in mineral soils), can be eliminated by using the tier 1 (tier 2) approach with application of the "draft" national AD.

(b) In some areas, especially in relation to soil carbon changes in mineral soils under source category 5.D, harmonization and verification of information from different sources (a CORINE land-use map, a cadastre system, a forest inventory etc.) are needed to establish the appropriate data for land-use change.

(c) There are some inconsistencies in reporting (liming, cultivation of organic soils), and improvements relating to the reporting process and its future application are therefore recommended.

VI. WASTE

A. Sector overview

130. In the year 2002 the Waste sector accounted for 1.4 per cent of total national GHG emissions. The emissions trend in this sector has been steadily decreasing through the years. Between 1990 and 2002 emissions fell by about 60.0 per cent, or 21,563 Gg CO_2 equivalent. Most of the decrease was due to falling CH_4 emissions from solid waste disposal on land, which is a key source. Only two source categories are calculated in this sector, namely solid waste disposal and waste-water handling. Waste incineration is not reported here because it is included in the Energy sector.

Completeness

131. The CRF includes estimates of all gases and sources of emissions from the Waste sector except for N_2O in industrial waste-water handling. The absence of estimates in this source category is, however, understandable because of the lack of research in this area. Germany's Länder-specific N_2O EF studies may enable it to estimate emissions in this source category in the future.

132. The additional information tables in the CRF sectoral background data tables for both solid waste disposal and waste-water handling are not filled in. While the ERT recognizes the difficulty of tabulating information that does not necessarily conform to these IPCC categories, it recommends that these tables be completed as far as possible to provide greater clarity in the emissions estimates for this sector. Completing these tables will also allow for some inter-country comparison, which can help in assuring the quality of the emissions estimates. Where information cannot readily be allocated to these cells, Germany can include such information in the NIR.

Transparency

133. Information is amply provided in the NIR but it could be organized more clearly. The ERT suggests that information be laid out in a tabular format that lists the parameters adopted in the calculations in chronological order to highlight the pre- and post-reunification periods since the changes consequent on reunification do affect the emissions estimates significantly. The NIR text in this sector can be confusing, especially about the changes that happened in the transition to reunification. For example, waste pathways are not always clearly described in the NIR text. The ERT therefore suggests for the future that it might be worthwhile to depict waste pathways (present and projected) in simple schematic diagrams that can be further described in the NIR text.

134. Emissions associated with waste incineration are not clearly indicated in the CRF or the NIR although these emissions have been included under the Energy sector. The use of the notation key "NO" instead of "IE" for waste incineration adds to the confusion. The ERT therefore recommends that this notation key be changed, with a clear indication (described in the CRF documentation box under table 6.C and/or the NIR) as to where in the Energy CRF tables the incineration-based emissions can be found. The ERT also suggests that Germany include in its future submissions a brief description of how these emissions are calculated.

135. Greater care should be exercised in using the IPCC notation keys such as "NE" and "NO". For instance, CRF entries that have been labelled "NE" can actually be filled in for some cells, such as those in CRF table 6.A, with information from the NIR. In other instances, "NO" should be used when the activity or process itself does not generate any emissions at all. Thus, for example, net CH_4 emissions in waste-water handling that are negligible simply because CH_4 production cancels out recovery or flaring should be indicated not by "NO" but by a low number such as zero. The reason for this will be made clear by filling in the amounts of CH_4 generated and recovered/flared in the cells provided by the sectoral background data table on waste-water handling (e.g., CRF table 6.B).

Recalculations and time-series consistency

136. Information on recalculations has not been formally included in table 8 even though extensive recalculations have been done and are documented in this chapter in the NIR. The ERT recommends that recalculations be documented in the CRF and not just in the NIR to enable tracking of the changes that are understandably encountered in compiling inventories from year to year. For example, quantifying the impact of using a tier 2 approach on solid waste disposal emissions estimates is important because, as Germany explained during the review, emission values have been found to be overestimated on average and overestimation is expected to continue despite regulatory measures and technological changes in the near future.

Uncertainties

137. No calculation of uncertainty has been done for this sector. The ERT recommends that this calculation be done in view of the quality of AD during the period before reunification and the changes that occurred in the transition to post-reunification Germany.

Verification and quality assurance/quality control approaches

138. The QA/QC procedures adopted in this sector are adequately described in the NIR and were elaborated further during the in-country review.

B. Key sources

Solid waste disposal on land – CH_4

139. The adoption of a tier 2 methodology, using a first order decay (FOD) model, for this key source is commendable. This requires a long data set, which stretches back 30 years. The ERT commends the efforts of the inventory team in trying to reconstruct this data set despite the difficulties encountered in pre-reunification Germany. The estimates calculated by the FOD model will depend largely on the integrity of this long-term data set. The ERT therefore recommends that the sudden increase in municipal solid waste, from 11,649 to 15,981 Gg, between 1998 and 1999 be examined. In addition, the ERT noted that for the last two inventory submissions the estimates for the last two years have been the same. This has been explained as being due to data flow schedules of the Federal Statistics Office, the timing of which will be addressed in future inventory compilations.

140. The aggregated degradable organic carbon (DOC) calculation requires waste fraction values, which are not clearly explained in the NIR nor listed in the CRF additional information table (table 6A, C). The ERT recommends that these fractions be explained in future. For greater clarity, a tabular format for these values, including a time stamp to indicate pre- and post-reunification changes, is suggested.

141. For waste composition, Germany uses a mix of IPCC and its own categories, such as bulky waste. The ERT recommends a brief description of these non-IPCC categories in the NIR to facilitate understanding of the DOC fractions associated with them.

142. For its FOD calculation, Germany uses a decay time constant (k) value of 0.14, which translates to a half-life of about five years. This is well within the IPCC range and has been justified by Germany's own waste separation practices and landfill management studies. The ERT acknowledges this value and recommends that, as Germany's waste composition and quantities change in the future, this value may need to be re-examined.

143. The ERT recommends the following changes in the use of notation keys for this key source: CO_2 emissions should be reported as "NO" rather than "NE"; and in table 6.A the "NE" entries for MCF, DOC and CH_4 recovery should be changed to "IE", in which case text can be entered in the documentation box to indicate where in the NIR these values are explained.

Waste-water handling – CH_4

144. Even if minimal on the level assessment, this is a key source by trend assessment, mainly because of the large decrease, from 106 to 6.3 Gg CH_4, between 1990 and 2002. This decrease is explained clearly and adequately in the NIR as being due to the use of open sludge digestion in the early 1990s and its prohibition from 1995 onward.

145. Waste-water AD (both domestic/commercial and industrial) are not shown in the CRF although some of these (such as data concerning domestic/commercial waste water) are described in the NIR. Germany acknowledges the availability of industrial waste-water volume data but not of chemical oxygen demand (COD) content. The ERT therefore noted the importance of determining whatever additional information is needed to estimate CH_4 emissions even if most of the CH_4 is eventually recovered or flared. If some of the waste-water handling processes do not lead to appreciable CH_4 emissions (such as aerobic treatment), then the ERT encourages Germany to describe these processes in the NIR and quantify their contributions to emissions from waste-water handling. This type of information needs to be entered in the additional information table (table 6.B) as well. Moreover, as mentioned in paragraph 135 above, Germany needs to revise its "NO" entries for CH_4 estimation in waste-water and sludge treatment.

C. Non-key sources

Waste-water handling – N_2O

146. The NIR cites Germany's own Länder-specific N_2O EF that can be applied for both municipal and industrial waste-water treatment. Although this is still up for review and scientific confirmation, Germany has signified its intention to use such EFs in the future if they are proved to be accurate for the entire country. The ERT encourages this intention and encourages Germany to facilitate such a review. In the industrial sector, the non-estimation of N_2O emissions is understandable because of the lack of adequate research on this topic. The ERT, however, recommends that the notation key "NO" be revised to "NE" for N_2O emissions associated with industrial waste-water handling.

D. Areas for further improvement

Identified by the Party

147. For solid waste disposal, Germany acknowledges the need to improve its data on landfill gas use, citing "considerable disagreement" among its data sources. It likewise sees a need to estimate emissions from industrial solid waste, which are not included in the present submission because of the absence of waste composition data.

148. In waste-water handling, Germany has identified the need to review its Länder-specific N_2O EFs, which can be applied for both municipal and industrial waste-water handling. It also sees the need to review the sources of the data on protein intake that serve as the basis for estimating its municipal waste-water N_2O emissions.

Identified by the ERT

149. The ERT confirms what Germany has identified as its areas for improvement and has nothing further to add to recommendations identified above at the sectoral and source category levels.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2003 and 2004 Inventory submissions of Germany. 2004 submission including a set of CRF tables for 1990–2002 and an NIR.

UNFCCC secretariat (2004). "Report of the individual review of the greenhouse gas inventory of Germany submitted in the year 2003 (centralized review)". FCCC/WEB/IRI(3)/2003/DEU (available on the secretariat web site at http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/deurep03.pdf

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UNFCCC secretariat. Review findings for Germany (unpublished).

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B. Additional materials

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Pfeiffer, F., M. Struschka and G. Baumbach, 2000. Determination of averaged EFs for the presentment of the future development of emissions from combustion units in households and the small consumer sector. University of Stuttgart. UBA-FB 295 46 364. (in German) (referenced in the NIR as "UBA, 2000a: UBA-Text 14/00: Pfeiffer, Frank/Struschka, Michael, Baumbach, Günter: Ermittlung der mittleren Emissionsfaktoren zur Darstellung der Emissionsentwicklung aus Feuerungsanlagen im Bereich der Haushalte und Kleinverbraucher, Institut für Verfahrenstechnik und Dampfkesselwesen, Universität Stuttgart, Herausgeber: Umweltbundesamt, FKZ 295 46 364, Berlin").

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Research project 202 42 266, UBA, 2004: IZT, KPMG, DFIU: Arbeitsergebnisse aus dem F+E-Vorhaben 202 42 266 Bestimmung und Einführung von Methoden zur Qualitätssicherung und Qualitätskontrolle für die deutschen Inventare der Treibhausgasemissionen entsprechend den Vorgaben der Klimarahmenkonvention (KRK) und der Anforderung der ECE-Luftreinhaltekonvention (unveröffentlicht)

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