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**Report of the individual review of the annual submission of  
Germany submitted in 2011\***

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\* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

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## I. Introduction and summary

### A. Overview

1. This report covers the centralized review of the 2011 annual submission of Germany, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 19 to 24 September 2011 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Takeshi Enoki (Japan) and Mr. Dennis Rudov (Belarus); energy – Mr. Tomas Gustafsson (Sweden), Ms. Agnieszka Janowska (European Union (EU) ) and Ms. Inga Valuntiene (Lithuania); industrial processes – Mr. Kiyoto Tanabe (Japan) and Mr. Hongwei Yang (China); agriculture – Ms. Britta Hoem (Norway) and Ms. Tajda Mekinda-Majaron (Slovenia); land use, land-use change and forestry (LULUCF) – Mr. Kevin Black (Ireland) and Mr. Robert de Ligt (Australia); and waste – Ms. Sirinthornthep Towprayoon (Thailand) and Ms. Medea Inashvili (Georgia). Mr. Tanabe and Mr. Yang were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova-Brankova and Ms. Astrid Olsson (UNFCCC secretariat).

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

### B. Emission profiles and trends

3. In 2009, the main greenhouse gas (GHG) in Germany was carbon dioxide (CO<sub>2</sub>), accounting for 85.8 per cent of total GHG emissions<sup>1</sup> expressed in carbon dioxide equivalent (CO<sub>2</sub> eq), followed by nitrous oxide (N<sub>2</sub>O) (7.2 per cent) and methane (CH<sub>4</sub>) (5.3 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 1.7 per cent of the overall GHG emissions in the country. The energy sector accounted for 82.6 per cent of total GHG emissions, followed by the industrial processes sector (8.0 per cent), the agriculture sector (7.9 per cent), the waste sector (1.3 per cent) and the solvent and other product use sector (0.2 per cent). Total GHG emissions amounted to 919,698.16 Gg CO<sub>2</sub> eq and decreased by 26.5 per cent between the base year<sup>2</sup> and 2009.

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

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<sup>1</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>2</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions include emissions from Annex A sources only.

Table 1  
**Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2009<sup>a</sup>**

|                 |                          | <i>Gg CO<sub>2</sub>eq</i> |                              |              |             |             |             |             |             | <i>Change</i> |                                |    |
|-----------------|--------------------------|----------------------------|------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|---------------|--------------------------------|----|
|                 |                          | <i>Greenhouse gas</i>      | <i>Base year<sup>a</sup></i> | <i>1990</i>  | <i>1995</i> | <i>2000</i> | <i>2005</i> | <i>2007</i> | <i>2008</i> | <i>2009</i>   | <i>Base year–<br/>2009 (%)</i> |    |
| Annex A sources |                          | CO <sub>2</sub>            | 1 041 688.25                 | 1 041 688.25 | 930 419.80  | 890 994.45  | 863 954.82  | 847 276.47  | 847 966.64  | 788 803.43    | –24.3                          |    |
|                 |                          | CH <sub>4</sub>            | 107 283.85                   | 107 283.85   | 92 194.13   | 74 755.46   | 57 223.91   | 52 046.00   | 51 258.80   | 48 794.27     | –54.5                          |    |
|                 |                          | N <sub>2</sub> O           | 87 067.89                    | 87 067.89    | 81 852.94   | 64 230.44   | 64 161.58   | 65 338.94   | 66 593.74   | 66 493.35     | –23.6                          |    |
|                 |                          | HFCs                       | 6 468.77                     | 4 368.78     | 6 468.77    | 6 482.98    | 10 000.56   | 11 144.95   | 11 473.59   | 11 952.19     | 84.8                           |    |
|                 |                          | PFCs                       | 1 749.60                     | 2 707.58     | 1 749.60    | 781.39      | 708.51      | 529.82      | 531.20      | 432.41        | –75.3                          |    |
|                 |                          | SF <sub>6</sub>            | 7 220.40                     | 4 785.03     | 7 220.40    | 4 826.15    | 3 726.46    | 3 536.52    | 3 287.64    | 3 222.50      | –55.4                          |    |
| KP-LULUCF       | Article 3.3 <sup>b</sup> | CO <sub>2</sub>            |                              |              |             |             |             |             | –3 400.36   | –3 717.39     |                                |    |
|                 |                          | CH <sub>4</sub>            |                              |              |             |             |             |             | IE, NO      | IE, NO        |                                |    |
|                 |                          | N <sub>2</sub> O           |                              |              |             |             |             |             | 0.01        | 0.01          |                                |    |
|                 | Article 3.4 <sup>c</sup> | CO <sub>2</sub>            | NA                           |              |             |             |             |             |             | –20 604.49    | –20 576.98                     | NA |
|                 |                          | CH <sub>4</sub>            | NA                           |              |             |             |             |             |             | 0.16          | 0.22                           | NA |
|                 |                          | N <sub>2</sub> O           | NA                           |              |             |             |             |             |             | 0.15          | 0.15                           | NA |

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

<sup>a</sup> “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

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

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

Table 2

**Greenhouse gas emissions by sector and activity, base year to 2009<sup>a</sup>**

|                    | Sector                        | Gg CO <sub>2</sub> eq           |                     |                     |                     |                     |                   |                   |                   | Change<br>Base year–<br>2009 (%) |
|--------------------|-------------------------------|---------------------------------|---------------------|---------------------|---------------------|---------------------|-------------------|-------------------|-------------------|----------------------------------|
|                    |                               | Base year <sup>a</sup>          | 1990                | 1995                | 2000                | 2005                | 2007              | 2008              | 2009              |                                  |
| Annex A            | Energy                        | 1 019 040.69                    | 1 019 040.69        | 903 116.73          | 857 746.99          | 826 034.87          | 807 503.52        | 809 591.49        | 760 126.35        | –25.4                            |
|                    | Industrial processes          | 98 047.79                       | 94 470.40           | 96 951.02           | 77 080.77           | 80 622.70           | 84 561.29         | 81 955.43         | 73 262.07         | –25.3                            |
|                    | Solvent and other product use | 4 538.56                        | 4 538.56            | 3 614.92            | 2 971.21            | 2 113.56            | 2 010.93          | 1 874.24          | 1 847.77          | –59.3                            |
|                    | Agriculture                   | 86 740.21                       | 86 740.21           | 76 402.73           | 77 191.16           | 73 402.41           | 71 466.01         | 74 508.07         | 72 702.19         | –16.2                            |
|                    | Waste                         | 43 111.50                       | 43 111.50           | 39 820.25           | 27 080.73           | 17 602.31           | 14 330.96         | 13 182.39         | 11 759.78         | –72.7                            |
|                    | LULUCF                        | NA                              | –31 174.84          | –31 849.15          | –32 383.99          | 15 760.66           | 15 188.08         | 15 216.44         | 17 563.34         | NA                               |
|                    | <b>Total (with LULUCF)</b>    | <b>NA</b>                       | <b>1 216 726.53</b> | <b>1 088 056.50</b> | <b>1 009 686.87</b> | <b>1 031 297.17</b> | <b>995 060.79</b> | <b>996 328.06</b> | <b>937 261.50</b> | <b>NA</b>                        |
|                    | <b>Total (without LULUCF)</b> | <b>1 251 478.76</b>             | <b>1 247 901.37</b> | <b>1 119 905.65</b> | <b>1 042 070.86</b> | <b>1 015 536.51</b> | <b>979 872.71</b> | <b>981 111.62</b> | <b>919 698.16</b> | <b>–26.5</b>                     |
|                    | Other <sup>b</sup>            | NA                              | NA                  | NA                  | NA                  | NA                  | NA                | NA                | NA                | NA                               |
| KP-LULUCF          | Article<br>3.3 <sup>c</sup>   | Afforestation and reforestation |                     |                     |                     |                     |                   | –4 476.40         | –4 779.19         |                                  |
|                    |                               | Deforestation                   |                     |                     |                     |                     |                   | 1 079.81          | 1 065.64          |                                  |
|                    |                               | <b>Total (3.3)</b>              |                     |                     |                     |                     |                   | <b>–3 396.59</b>  | <b>–3 713.55</b>  |                                  |
|                    | Article<br>3.4 <sup>d</sup>   | Forest management               |                     |                     |                     |                     |                   | –20 555.93        | –20 526.72        |                                  |
|                    |                               | Cropland management             | NA                  |                     |                     |                     |                   | NA                | NA                | NA                               |
|                    |                               | Grazing land management         | NA                  |                     |                     |                     |                   | NA                | NA                | NA                               |
|                    |                               | Revegetation                    | NA                  |                     |                     |                     |                   | NA                | NA                | NA                               |
| <b>Total (3.4)</b> | <b>NA</b>                     |                                 |                     |                     |                     |                     | <b>–20 555.93</b> | <b>–20 526.72</b> | <b>NA</b>         |                                  |

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

<sup>a</sup> “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

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

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

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

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

Table 3

**Information to be included in the compilation and accounting database in t CO<sub>2</sub> eq**

|                                                                                                             | <i>As reported</i> | <i>Revised estimates</i> | <i>Adjustment<sup>a</sup></i> | <i>Final<sup>b</sup></i> | <i>Accounting quantity<sup>c</sup></i> |
|-------------------------------------------------------------------------------------------------------------|--------------------|--------------------------|-------------------------------|--------------------------|----------------------------------------|
| <b>Commitment period reserve</b>                                                                            | 4 381 287 024      |                          |                               | 4 381 287 024            |                                        |
| <b>Annex A emissions for current inventory year</b>                                                         |                    |                          |                               |                          |                                        |
| CO <sub>2</sub>                                                                                             | 788 803 432        |                          |                               | 788 803 432              |                                        |
| CH <sub>4</sub>                                                                                             | 48 794 274         |                          |                               | 48 794 274               |                                        |
| N <sub>2</sub> O                                                                                            | 66 493 350         |                          |                               | 66 493 350               |                                        |
| HFCs                                                                                                        | 11 952 193         |                          |                               | 11 952 193               |                                        |
| PFCs                                                                                                        | 432 411            |                          |                               | 432 411                  |                                        |
| SF <sub>6</sub>                                                                                             | 3 222 503          |                          |                               | 3 222 503                |                                        |
| <b>Total Annex A sources</b>                                                                                | <b>919 698 163</b> |                          |                               | <b>919 698 163</b>       |                                        |
| <b>Activities under Article 3, paragraph 3, for current inventory year</b>                                  |                    |                          |                               |                          |                                        |
| 3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported | -4 779 192         |                          |                               | -4 779 192               |                                        |
| 3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported     | NO                 |                          |                               | NO                       |                                        |
| 3.3 Deforestation for current year of commitment period as reported                                         | 1 065 642          |                          |                               | 1 065 642                |                                        |
| <b>Activities under Article 3, paragraph 4, for current inventory year<sup>d</sup></b>                      |                    |                          |                               |                          |                                        |
| 3.4 Forest management for current year of commitment period                                                 | -20 526 717        |                          |                               | -20 526 717              |                                        |
| 3.4 Cropland management for current year of commitment period                                               |                    |                          |                               |                          |                                        |
| 3.4 Cropland management for base year                                                                       |                    |                          |                               |                          |                                        |
| 3.4 Grazing land management for current year of commitment period                                           |                    |                          |                               |                          |                                        |
| 3.4 Grazing land management for base year                                                                   |                    |                          |                               |                          |                                        |
| 3.4 Revegetation for current year of commitment period                                                      |                    |                          |                               |                          |                                        |
| 3.4 Revegetation in base year                                                                               |                    |                          |                               |                          |                                        |

*Abbreviations:* NA = not applicable, NO = not occurring.

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

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

<sup>d</sup> Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

## II. Technical assessment of the annual submission

### A. Overview

#### 1. Annual submission and other sources of information

6. The 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and a national inventory report (NIR). Germany also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

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

8. During the review, Germany provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

#### Completeness of inventory

9. The inventory covers all mandatory source and sink categories for the period 1990 to 2009 and is complete in terms of years and geographical coverage. Germany reports various country-specific categories. The ERT commends the Party for its efforts to ensure the completeness of the inventory.

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

##### Overview

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

11. The previous review report detected some areas for improvement for the institutional arrangements, namely related to the need for timely supply of data for the energy sector and related to the identification of land areas, and the need for further quality assurance/quality control (QA/QC) procedures in the LULUCF sector. The ERT noted that improvements were made in the national energy balance (NEB) QA/QC, and that an action plan for

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

agriculture and forestry (see para. 15 below) has been included in the NIR and the Party informed the ERT about the ongoing activities in the area and that the plan will be completely implemented for the 2012 annual submission.

12. The Party described the changes of the national system since the previous annual submission and these changes are discussed in the paragraphs below and chapter II.G.3 of this report.

#### Inventory planning

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

14. The Federal Statistical Office discontinued data collection for, and publication of, iron and steel sector statistics as of 31 December 2009, but a voluntary commitment was signed in June 2011 to ensure the provision of necessary data (see para. 119 below). During the review, Germany informed the ERT that the commitment for semiconductor production statistics is also expiring soon and that UBA is currently in negotiations with Zentralverband Elektrotechnik- und Elektronikindustrie e.V. for a new commitment for annual data delivery. The ERT welcomes Germany's efforts to maintain the institutional arrangements necessary to prepare inventories, and recommends that Germany take the necessary steps to ensure the time-series consistency of the inventory.

15. In response to the previous review, an action plan for the LULUCF sector was developed and implemented. The new system for preparing the land-use matrix (LUM) based on a plot grid and land identification has been updated based on a quality hierarchy of nationally available data, including a consistent time series of LUMs back to 1990. The QA/QC measures of the action plan have also been implemented. A 'four eyes principle' of methodology development and calculations, independent double-checks of calculations, cross-checks for completeness and consistency across categories and time and witness audits of calculations are in the process of being systematically applied. In particular, the coordination between BMELV, Johann Heinrich Von Thünen Institute and UBA in the LULUCF sector has been intensified by joint use of the web-based system for documentation and preparation of the NIR for LULUCF and by regular meetings, documented by minutes of meeting results. The ERT welcomes these improvements of the national system for the LULUCF sector and recommends that Germany continue the implementation of all components of the action plan for the preparation of future inventories. In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.

16. Germany informed the ERT that inventory planning is updated annually following discussions inside the single national entity (UBA) and with the National Co-ordination Committee to set the priorities for the improvement work. The prioritization mostly takes place through the assigning of deadlines, taking into account the importance and complexity of the task and financial and personnel aspects.



## Inventory preparation

### *Key categories*

17. Germany has reported a key category tier 1 analysis, both level and trend assessments, as part of its 2011 submission. The key category analysis performed by the Party and that performed by the secretariat<sup>4</sup> produced similar results owing to the different levels of disaggregation being used by Germany (e.g. combining all fuels for each category in the energy sector). Germany has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). Germany has also conducted a key category tier 2 analysis for 2009 which added some key categories to the analysis.

18. During the review, Germany informed the ERT that it is planning to include qualitative criteria in its next annual submission. The ERT welcomes this plan to improve the key category analysis in Germany and recommends that Germany document the criteria it uses in its next annual submission. In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.

19. Germany has also conducted a key category assessment for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, following the IPCC good practice guidance for LULUCF. However, all KP-LULUCF activities (CO<sub>2</sub>) are identified as key categories according to CRF table NIR 3, while annex 1 to the NIR included only afforestation/reforestation and forest management (CO<sub>2</sub>) as key categories. The ERT recommends that Germany ensure consistency of its reported key category analysis results in its next annual submission.

### *Uncertainties*

20. Germany has performed a tier 1 uncertainty analysis as part of its 2011 submission. The uncertainty analysis is consistent with the IPCC good practice guidance and the method and results are explained in the NIR. For the level analysis, the overall uncertainty of the national emissions with LULUCF is 6.6 per cent for the year 2009 and 7.1 per cent for the trend. The uncertainty is higher than the previous year's submission (3.8 level and 4.1 trend) and the reason is explained in the NIR.

21. The ERT noted some inconsistencies in the NIR explaining the tier applied. The tier 2 analysis is performed every three years (most recently for the 2010 submission). However, in some places in the NIR it is mentioned that tier 1 is applied for the 2011 submission, and elsewhere references are made to tier 2. The ERT recommends that Germany enhance the QC of the NIR before submission in order to avoid inconsistencies of information.

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<sup>4</sup> The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

*Recalculations and time-series consistency*

22. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the Party of the time series 1990–2008 have been undertaken to take into account changes/improvements in activity data (AD) (e.g. updated NEBs, population and wastewater data), emission factors (EFs) (e.g. CH<sub>4</sub> and N<sub>2</sub>O EF for road transportation) or parameters (e.g. average gross intake of livestock, changes in the carbon-accumulation factor and information from the ATKIS (Amtliches Topographisch-Kartographisches Informationssystem) database) and the method (e.g. for CO<sub>2</sub> emissions from methanol production). The major changes, and the magnitude of the impact, include: a decrease in estimated total GHG emissions in 1990 (0.2 per cent) and a decrease in 2008 (0.3 per cent). The rationale and impact of these recalculations is generally provided in the NIR and in CRF table 8(b). However, the ERT noted that in some cases further documentation of the recalculations is needed (see paras. 36, 55, 63, 67 and 79 below) and recommends that Germany improve the transparency of its recalculations at the category level in its next annual submission.

*Verification and quality assurance/quality control approaches*

23. UBA has overall responsibility for QA/QC procedures. UBA has an in-house directive on the quality assurance of emissions reporting<sup>5</sup> describing the QA/QC requirements, which are based on the IPCC good practice guidance. UBA has described and implemented QA/QC plan in accordance with decision 19/CMP.1. The quality system (QSE)<sup>6</sup> provides the necessary framework for good inventory practice and for routine quality assurance in Germany. It includes a description of the processes necessary for the continual improvement of the inventory and a description of the responsibilities and quality objectives relative to the selection of methods, data collection, calculation of emissions and relevant uncertainties and the recording of completed quality checks and their results.

24. The ERT noted that despite the QC procedures, it nevertheless detected inconsistencies in the CRF tables (e.g. between table 1.C and table 1.A(b) for gas/diesel oil (international marine bunkers) for all years) and the NIR (e.g. incorrect cross-references for figures and tables in the LULUCF sector). The ERT recommends that the Party include additional QC procedures so as to ensure the consistency of reported data and to improve cross-referencing in its next annual submission.

25. In response to questions raised by the ERT during the review about the previous review's encouragement regarding data collected under the EU emissions trading scheme (ETS) for the verification of emissions data in the energy and industrial processes sectors, Germany informed the ERT that it has started a research project on data exchange between the EU ETS and national GHG inventory reporting focusing on detailed category-specific comparisons. The expected outputs are recommendations for possible improvements and documentation of existing differences between the two approaches. The ERT commends Germany for conducting this research project and encourages Germany to report the improvements that will be considered in response to this research study.

*Transparency*

26. The NIR submitted by Germany is generally transparent and the ERT noted some improvements in the transparency with regard to the previous submission (e.g. energy, agriculture and LULUCF sectors). However, the ERT concluded that there is still room for improvements, particularly with regard to the justification of the country-specific EFs and assumptions used, the explanation of the fluctuations of the AD and parameters (e.g. in the

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<sup>5</sup> Qualitätskontrolle und Qualitätssicherung der Emissionsberichterstattung, Hausanweisung 11/2005.

<sup>6</sup> Das Qualitäts-System Emissionsinventare – QSE.

energy and LULUCF sectors) and the explanations of applied recalculations (see paras. 50, 51, 76 and 83 below). Aggregated reporting of subcategories (e.g. in the energy sector), confidentiality issues with reported data (in the industrial processes sector) and some inconsistencies detected in the NIR (e.g. references to 2008 instead of 2009 in the key category analysis) further decrease the transparency of the reporting. The ERT recommends that Germany improve, in its next annual submission, the transparency of its reporting by providing more detail on the methods and EFs used, so that reviewers can fully assess the underlying assumptions and rationale for choices of data, methods and other inventory parameters, together with further justification and disaggregated information on the applied recalculations at category level. In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.

#### Inventory management

27. Germany has a centralized archiving system within the UBA quality system on emission inventories, which includes the archiving of disaggregated EFs and AD (used in the Central System of Emissions database), and documentation on how these EFs and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. During the review, the ERT was provided with all requested additional archived information in a timely manner.

### **3. Follow-up to previous reviews**

28. Germany is commended for the improvements undertaken as a response to recommendations from previous reviews, including: application of QA/QC procedures to the NEB, the reporting of emissions from marine bunkers, the commencement of a research project focused on data exchange between the EU ETS and national GHG reporting, revision of the methane conversion factor (MCF) for dairy cows, and implementation of the action plan to ensure consistent representation of land areas.

29. The ERT identified the following issues that are pending from the previous review: an improvement in the timeliness of the provision of the NEB; the inclusion of information on the results of the QA/QC procedures; and the provision of more detailed information on the adverse impacts of policies and measures, including the impacts of the policies and measures of the EU, implemented in Germany under Article 3, paragraph 14, of the Kyoto Protocol. In response to the draft review report, Germany informed the ERT that these recommendations are addressed in its 2012 submission. The ERT appreciates this information, and welcomes the commitment of Germany to address all the other recommendations of the review process as early as possible. Other pending recommendations for the sectors are reiterated within the relevant sector chapters of this report.<sup>7</sup>

### **4. Areas for further improvement**

#### Identified by the Party

30. The 2011 NIR identifies planned improvement at the category-specific level. Following a recommendation from the previous review report, the planned improvements

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<sup>7</sup> Germany informed the ERT that the recommendations from previous review reports reiterated in paragraphs 29, 30, 39, 42, 45, 47, 65, 74, 85, 86, 99, 100 and 110 were not implemented in the 2011 inventory submission due to the late availability of the 2011 annual review report and that all these recommendations are addressed in the 2012 submission.

are also summarized in table 245 of the NIR. The ERT commends the Party for summarizing the planned improvements but reiterates the previous recommendation that Germany also provide, in its next NIR, a plan outlining how and when it intends to implement the identified areas for improvement.

31. In response to questions raised by the ERT during the review, Germany indicated that it is working to make some specific improvements, such as the harmonization of International Energy Agency (IEA) reporting and CRF data in the energy sector and the improvement of stable type distribution, pasture times and storage type distribution data in the agriculture sector. Details of such ongoing improvements are explained in the sectoral chapters of this report.

Identified by the expert review team

32. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 136 below.

33. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

## **B. Energy**

### **1. Sector overview**

34. In 2009, emissions from the energy sector amounted to 760,126.35 Gg CO<sub>2</sub> eq, or 82.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 25.4 per cent. The key drivers for the fall in emissions are a shift in the fuel use from solid to gaseous fuel and the increased share of nuclear power and renewable energy sources in electricity generation. Within the sector, 45.2 per cent of the emissions were from energy industries, followed by 20.2 per cent from transport, 19.4 per cent from other sectors and 13.5 per cent from manufacturing industries and construction. Fugitive emissions from fuel accounted for 1.6 per cent and other (stationary) accounted for 0.2 per cent.

35. The Party has made recalculations for the energy sector between the 2010 and 2011 submissions mainly in response to the 2010 annual review report and due to updated NEBs. The impact of the recalculations on the energy sector is an increase in emissions of 3.8 per cent for 2008. The main recalculations took place in the following categories:

(a) Manufacturing industries and construction, energy industries and other sectors (15.6, 2.8 and 2.0 per cent increases respectively) due to new methods for estimating emissions related to iron and steel. Recalculations are mainly due to the reallocation of emissions related to industrial processes to energy-related emissions and due to the revision of the provisional energy balances to final statistics in public electricity and heat production and energy industries;

(b) Oil and natural gas fugitive emissions (5.7 per cent increase) due to new CO<sub>2</sub> and N<sub>2</sub>O EFs for flaring of oil products.

36. Recalculations are listed in the NIR by category, but are not always transparently explained and quantified. During the course of the review, Germany provided underlying information to support the recalculations and the ERT agrees with the recalculated figures. The ERT encourages Germany to improve the transparency of the inventory in its next annual submission by including, especially for key categories, quantitative descriptions of recalculations along with a documented underlying rationale for why the recalculation is improving the inventory quality, as prescribed by the IPCC good practice guidance.

37. The energy sector is complete in terms of categories, gases, years and geographical coverage.

38. The NIR is generally transparent and has been improved since the last annual submission. AD and EFs are widely referenced and presented in tables in the NIR. However, the ERT noted some instances where the implied emission factors (IEFs) for Germany show significant changes over time or large discrepancies compared with other countries and there are insufficient explanations in the NIR (see para. 51 below). The ERT recommends that Germany increase the transparency and comparability of its inventory in its next annual submission by including brief descriptions of the main drivers behind the changes in AD including, among other things, information on the nuclear and renewable energy shares and trends. The ERT also recommends that the Party further improve the description of the underlying rationale for country-specific EFs applied, especially for key categories, in its next annual submission.

39. The previous review report noted several issues related to Germany's NEB (such as the timeliness of reporting; at times, significant differences between the preliminary and final NEB; the complexity of the NEB compiling process that may contribute to the problems with regard to timeliness and quality; efficiencies in blast furnaces were given as 108 per cent; significant statistical differences reported in the NEB data; lack of QA/QC procedures in place for some data sources used to compile the NEB; low comparability with the IEA data; significant amount of flaring/losses of natural gas in the NEB that were not transparently accounted for). The previous review report had recommended that Germany address these issues in an action plan in the 2011 submission. The ERT noted several improvements in the 2011 submission, namely: that the NEB is subject to QA/QC procedures in accordance with the national system; and that the significant amount of flaring/losses of natural gas are taken into account. During the review Germany explained that, since the summer of 2011 BMWi had initiated an amendment of the existing law intended to accelerate the data flow of official statistics. In addition, Germany explained that the way of reporting data to the IEA (e.g. on the split of fuel to international and domestic aviation) will be changed in order to harmonize the IEA reporting with the CRF data. The ERT commends Germany for its efforts to improve the inventory and the comparability with the IEA data. The ERT reiterates the recommendation of the previous review report that Germany prepare a plan for the remaining above-mentioned issues, and to report on it and on any progress achieved in its next annual submission.

40. In the 2011 NIR (pages 145 and 157) Germany states that some changes in the inventory reporting depend on which subcategory the operators choose when reporting their use of fuels in statistical surveys (e.g. hard coal mining plants have shifted in time to public electricity and heat production). The ERT finds that these changes may lead to inconsistencies in the time series. During the review, Germany explained that, as part of its QC procedures, it keeps track of the largest plants by comparing inventory data with available plant-specific data reported under the EU large combustion plant directive. The ERT recommends that the Party include the information on QC procedures in its next submission and, in order to explain time-series inconsistencies in line with the IPCC good practice guidance, document any changes in plant-specific emission allocation, for example, that are due to changes in the structure of the national energy statistics.

41. The ERT noted that Germany uses EU ETS data for the verification of some emission estimates (e.g. cement industry) but, due to differences in the reporting structure, comparison between EU ETS and inventory data is difficult. The ERT reiterates the previous review report's encouragement that Germany continue to use the EU ETS data to verify country-specific EFs and/or emission estimates, and to analyse significant differences between the two data sources and report on this in its next annual submission.

42. The ERT commends Germany for implementing most of the recommendations from the previous review report. In particular, in response to the recommendation of the previous review report, additional tables and graphical information on trends together with the drivers behind the trends have been included. The Party has rectified the incorrect use of notation keys in its previous submission for biomass consumption in navigation and railways, and has reported the CO<sub>2</sub> emissions from biomass consumption in navigation and railways under memo items. However, the ERT noted that some of the previous recommendations are still pending (see paras. 39 and 41 above and 45 and 47 below). In addition, Germany continues to report AD and emissions under manufacturing industries and construction in an aggregated manner and approximately 80 per cent of the total CO<sub>2</sub> emissions from manufacturing industries and construction in 2009 are reported under the subcategory other (manufacturing industries and construction). During the review, Germany informed the ERT that there is an ongoing discussion on the matter of trying to enable disaggregated reporting (e.g. by the use of EU ETS data). Germany further stated that ensuring time-series consistency for such disaggregated reporting is difficult. The ERT commends Germany for its effort to try to resolve the problem and reiterates the recommendation in the previous review report that Germany continue to assess the possibility to prepare emissions data at the same level of disaggregation as required for reporting in the energy CRF tables, and report on progress in its next annual submission.

43. Quantitative uncertainties for AD and EFs for several subcategories in manufacturing industries and construction (e.g. iron and steel) are not available in the NIR, but are available only as combined uncertainties reported as per cent of national total emissions. During the review, Germany provided the ERT with the underlying spreadsheets, including category uncertainties for AD and EFs. To increase the transparency of the inventory, the ERT recommends that Germany include this information in its next annual submission, preferably briefly in the category sections, but also as a whole in an annex to the NIR.

## **2. Reference and sectoral approaches**

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

44. CO<sub>2</sub> emissions from fuel combustion were estimated using the reference approach and the sectoral approach. For the year 2009, the ERT noted that, in CRF table 1.A(c), total CO<sub>2</sub> emissions estimated using the reference approach are 1.07 per cent lower than those estimated using the sectoral approach. However, at the fuel level the comparison results in larger differences, especially for solid fuels (-7.24 per cent) and liquid fuels (8.59 per cent). In the NIR, a comparison of the two approaches was presented, but it did not include a comparison for 2009. No explanations of the differences at the fuel-level are provided in the NIR. During the review, Germany informed the ERT about planned improvements to the 2012 submission, including, among other things, improvements to energy consumption data and the allocation of CO<sub>2</sub> in iron and steel production for the reference approach and a detailed discussion on carbon stored. The ERT commends Germany for its efforts to reconcile the differences between the approaches and encourages the Party to include qualitative and quantitative information on any remaining differences in the CRF documentation box and in the NIR of its next annual submission, especially for fuels and years with significant differences, as elaborated in the IPCC good practice guidance, and also encourages the Party to include in the discussion the entire time series.

45. The ERT also noted differences between the inventory data and the corresponding IEA data (e.g. for solid fuels exports, the data show differences of over 60 per cent in some recent years; the 2009 consumption of gasoline for domestic aviation in the IEA data set (660 TJ) is 11.0 per cent higher compared with the fuel consumption reported in the CRF (595 TJ); the 2009 CRF table 1.C records a jet kerosene consumption for international

aviation of 340,707 TJ whereas corresponding data provided by the Party to the IEA show 298,678 TJ). Germany has provided some explanations for the divergences and informed the ERT that it is continuing to investigate these differences. The ERT considers that the differences cause no underestimation of emissions, but reiterates the recommendation of the previous review report that Germany explain the reasons for these differences between its inventory data and the corresponding IEA data in its next annual submission.

#### *International bunker fuels*

46. Germany uses data from Eurocontrol to distinguish international aviation from civil aviation. International marine bunker emissions are based on AD for bunkering ocean-going ships provided in the NEB, which are separated from national navigation data owing to different tax regulations, in line with the IPCC good practice guidance. Deep sea fishing emissions are separated from international marine bunker emissions and reported under national fisheries, as recommended in the previous review report. During the previous review it was concluded that international transport on inland waterways (e.g. on the Rhine) is included in the domestic navigation emission estimates, which is not in line with the IPCC good practice guidance and is a potential overestimation of emissions. During the review week, Germany explained that there are no national statistics available to separate the emissions and that the Party has no plans to rectify this possible overestimation at the moment because it has only a small impact, and gathering relevant data would be resource intensive. The ERT appreciated this clarification and noted the difficulty in obtaining data to separate the emissions, but encourages Germany to find a way to separate the emissions from inland navigation activities and report emissions from international navigation activities as a memo item under domestic and international emissions bunker fuels by making appropriate assumptions, and to clearly describe them in the NIR.

#### *Feedstocks and non-energy use of fuels*

47. The ERT noted that Germany continues to use several carbon storage fractions (e.g. for natural gas (0.9) and liquefied petroleum gas (0.55)) that differ significantly from the defaults contained in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) (0.33 and 0.8, respectively) and the NIR still did not provide proper justifications for these departures from the Revised 1996 IPCC Guidelines. During the review, Germany explained that improvements to the fractions of carbon stored are ongoing and the documentation will be included in the next annual submission. The ERT commends Germany for its efforts to improve its reporting on feedstocks and non-energy use of fuels (e.g. the use of table 283 in the NIR for verification purposes) and reiterates the recommendation of the previous review report that the Party provide justifications of the methodology used and on any recalculations performed in its next annual submission.

48. Additional information for feedstocks and non-energy use of fuels in CRF table 1.A(d) is missing for all years. In order to increase the transparency of the reporting and to facilitate future reviews, the ERT encourages Germany to include the additional information in CRF table 1.A(d) in its next annual submission.

### 3. Key categories

#### Stationary combustion: solid fuel – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O<sup>8</sup>

49. In the 2011 submission, the methodology for reporting emissions from iron and steel production changed significantly. In order to increase AD disaggregation, more detailed AD from the operators<sup>9</sup> are used in the 2011 submission. The new method resulted in the reallocation of a significant share of the CO<sub>2</sub> emissions from industrial processes to fuel combustion. The ERT noted that there is not enough information in the NIR describing the new method and the NIR lacks information on what QA/QC activities are in place to ensure that no omissions or double counting of emissions occurs. In response to questions raised by the ERT during the review, Germany explained that to avoid double counting or underestimation of emissions the Party compiles a carbon balance and compares and analyses the EU ETS data with the inventory data in the frame of an ongoing project. The ERT recommends that Germany, in its next annual submission, improve the methodological information and report on the results of the project activities and on the QA/QC procedures undertaken to ensure accurate reporting.

#### Stationary combustion: biomass – CH<sub>4</sub>

50. The 2011 NIR states (p. 150) that data on biomass in public electricity and heat production are not consistently reported over time due to the limited availability of data for 1990–2002. The ERT noted that this may lead to inconsistencies in the time series. For example, the 2009 value for the CH<sub>4</sub> IEF for biomass (154.86 kg/TJ) is 1,481.0 per cent higher than the 1990 value (9.80 kg/TJ) and the increase is the highest reported by Parties (range –93.0 to +1,481.0 per cent). The information in the NIR was not sufficient to explain the change. In response to previous review stages, Germany explained that changes in the underlying AD and combustion technologies (i.e. EFs) largely effect the IEFs. The ERT recommends that Germany increase the transparency and comparability of its inventory in its next annual submission by including brief descriptions of the main drivers behind the changes in AD as well as the underlying rationale for the country-specific EFs applied and improve the time-series consistency by investigating whether additional data are available to make a revision of the time series, or if not, the ERT recommends that the Party use the splicing techniques provided in the IPCC good practice guidance.

#### Fugitive emissions from solid fuels: solid fuels – CH<sub>4</sub>

51. The 2009 CH<sub>4</sub> IEF (0.01 kg/t) for surface mines in Germany was the lowest reported by Parties (range 0.01–8.3 kg/t) and below the IPCC default range (0.20–1.34 kg/t). According to the NIR (page 228), for German soft lignite, the temperature does not exceed 50 °C during the coalification processes, while significant CH<sub>4</sub> releases occur only at temperatures above 80 °C (based on the results of a national study, (Ziegler et al., 1992)). From the NIR only, the ERT could not verify the low CH<sub>4</sub> EF used. During the review Germany presented underlying information from the study and the ERT believes that the figures are applicable to Germany. The ERT encourages the Party to verify that the EF is still valid for later years and to improve the justification for the use of the country-specific EF within the NIR.

<sup>8</sup> Not all emissions related to all gases under this category are key categories, particularly CH<sub>4</sub> and N<sub>2</sub>O emissions. However, since the calculation procedures for and issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

<sup>9</sup> Published in Fachserie 4 Reihe 8.1, versch. Jahrgänge: Statistisches Bundesamt; Fachserie 4, Reihe 8.1; Eisen und Stahl, Poeschel-Verlag.



#### 4. Non-key categories

##### Stationary combustion: other fuels – CH<sub>4</sub> and N<sub>2</sub>O

52. In the 2011 NIR, Germany included information on the EFs for several fuels included under other fuels and the relevant combustion technologies. However, such information was not provided for the CH<sub>4</sub> and N<sub>2</sub>O EFs for other fuels for public electricity and heat production and thus the ERT has not been able to review them properly. During the review, Germany provided the ERT with some underlying figures for the 2009 EFs. The ERT recommends that, in its next annual submission, Germany include the EFs in the NIR together with the relevant documentation.

### C. Industrial processes and solvent and other product use

#### 1. Sector overview

53. In 2009, emissions from the industrial processes sector amounted to 73,262.07 Gg CO<sub>2</sub> eq, or 8.0 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 1,847.77 Gg CO<sub>2</sub> eq, or 0.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 25.3 per cent in the industrial processes sector, and decreased by 59.3 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are: a decrease in CO<sub>2</sub> emissions from iron and steel production caused by a decrease in primary steel production, especially from 2008 to 2009, due to the economic situation, and by the reallocation of CO<sub>2</sub> emissions from blast furnace gas combustion to the energy sector; and also a decrease in N<sub>2</sub>O emissions from adipic acid production, due to the use of emissions-reducing equipment by the adipic acid producers. Within the industrial processes sector, 37.5 per cent of the emissions were from chemical industry, followed by 24.7 per cent from mineral products, 19.4 per cent from consumption of halocarbons and SF<sub>6</sub> and 17.0 per cent from metal production. Production of halocarbons and SF<sub>6</sub> accounted for 1.1 per cent. The remaining 0.3 per cent were from other (industrial processes).

54. The Party has made recalculations for the industrial processes sector as well as for the solvent and other product use sector between the 2010 and 2011 submissions following changes in AD, EFs, underlying assumptions (e.g. lifetime of equipment) and in order to rectify identified errors. The impact of these recalculations on the industrial processes sector is a decrease in emissions of 25.4 per cent for 2008. The impact of these recalculations on the solvent and other product use sector is a decrease in emissions of 44.5 per cent for 2008. The main recalculations took place in the following categories:

- (a) CO<sub>2</sub> emissions from iron and steel production due to a change in the method and EFs as well as due to a change in the allocation of emissions between the energy and industrial processes sectors;
- (b) SF<sub>6</sub> emissions from other (industrial processes) due to a change in the EF for SF<sub>6</sub> from aluminium foundries (see para. 67 below);
- (c) CO<sub>2</sub> emissions from other (chemical industry), due to a change in the EF for methanol production;
- (d) N<sub>2</sub>O emissions from other (solvent and other product use) due to a change in the EF based on new research information;
- (e) Indirect CO<sub>2</sub> emissions from the conversion of non-methane volatile organic compounds (NMVOCs) from all categories under solvent and other product use due to a change in the method used to calculate NMVOC emissions as well as a change of the conversion factor from NMVOCs to CO<sub>2</sub>.

55. For both the industrial processes sector and the solvent and other product use sector, the NIR and CRF tables are complete in terms of reported gases and categories and generally transparent. The methods and data used to calculate emissions, as well as category-specific information on uncertainties and QA/QC, are well explained for each category in the NIR, although the details are not transparently presented because of the confidentiality of some data. The ERT noted that for some recalculations (e.g. SF<sub>6</sub> from other (industrial processes), CO<sub>2</sub> from other (chemical industry)), CRF table 8(b) does not provide explanatory information. The ERT recommends that the Party improve the transparency of its reporting by providing information on all undertaken recalculation in CRF table 8(b) in its next annual submission.

56. The ERT noted that the Party had started a research project in December 2010 focused on data exchange between the EU ETS and national GHG reporting, in response to the recommendation in the previous review report regarding the use of data collected under the EU ETS for the verification of emissions data in the industrial processes sector. The project is still in process. The ERT commends Germany for this effort, and recommends that Germany improve the QA/QC procedures based on the results of this project, or report the progress of this project in its next annual submission.

57. The ERT noted that Germany has improved the transparency of its inventory reporting following the recommendation in the previous review report, but further improvement to enhance transparency is necessary. Details on this issue are discussed in the paragraphs on each category below. The ERT also noted that some of the recommendations from the previous review reports are still not implemented, namely the need to report CO<sub>2</sub> emissions from limestone and dolomite use as a whole (see para. 66 below) and the need to recalculate the potential emissions in accordance with the IPCC good practice guidance. In response to this question raised during the review, Germany informed the ERT that the work is in progress to evaluate the required data flow, and, in response to the draft review report, Germany informed the ERT that the pending recommendations are addressed in its 2012 submission.

## 2. Key categories

### Cement production – CO<sub>2</sub>

58. Germany calculates CO<sub>2</sub> emissions from cement production based on clinker production with a country-specific EF of 0.53 t CO<sub>2</sub>/t clinker, which is higher than the IPCC default value (0.51 t CO<sub>2</sub>/t clinker). Germany explains in the NIR that there is no need to take account of significant losses via the exhaust-gas pathway because dust separated from the exhaust gases is returned to the burning process in the German cement industry. This means that the cement kiln dust correction factor is 1.00. From the explanation given by Germany in the NIR, the ERT considers that Germany follows the IPCC tier 2 method, which is appropriate for this key category.

### Lime production – CO<sub>2</sub>

59. Germany obtains the lime production data from the German Lime Association, and also estimates the quantities produced by plants that are not included in the German Lime Association's statistics on the basis of the information available, such as data from operators and data published in the framework of the EU ETS. Thus, Germany continues to make efforts to take into account all of German lime production. This is in line with the correction made during the previous review, for which the ERT commends Germany.

60. Germany uses the stoichiometric EFs without taking into account the calcium oxide or the dolomitic lime content in lime. This may lead to an overestimation. The ERT

encourages Germany to verify the results of inventory estimation with the EU ETS data to avoid a possible overestimation of emissions.

#### Ammonia production – CO<sub>2</sub>

61. Germany explains in the NIR that it calculates CO<sub>2</sub> emissions from ammonia production in keeping with equation 3.3 in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) (tier 3 method), but also explains that it includes in the reported emissions the recovered quantity of CO<sub>2</sub> which is used in other production processes, such as urea production. The ERT noted that this is consistent with the Revised 1996 IPCC Guidelines. The data are collected from plant operators by the agricultural industry association, Industrieverband Agrar (IVA) and subject to QA checks by the IVA. The ERT considers the applied method appropriate for this key category.

#### Iron and steel production – CO<sub>2</sub>

62. Germany reports the sum of the following three components under this category: CO<sub>2</sub> emissions from use of reducing agents; CO<sub>2</sub> emissions from limestone use; CO<sub>2</sub> emissions from electrode consumption. This is not in line with the Revised 1996 IPCC Guidelines, according to which CO<sub>2</sub> emissions from limestone use in iron and steel production should be reported in the limestone and dolomite use category (see para. 66 below.)

63. Germany has made a recalculation of CO<sub>2</sub> emissions from use of reducing agents by implementing a carbon balance approach instead of using a theoretical factor for the quantities of reducing agent required for an ideal blast furnace process. Following a recommendation in the previous review report, Germany has changed the way it allocates CO<sub>2</sub> emissions between the energy and industrial processes sectors in order to make its reporting more consistent with the IPCC good practice guidance. The recalculation and the change in allocation resulted in remarkably lower emissions being reported in this category compared with those reported previously (e.g. CO<sub>2</sub> emissions from use of reducing agents in 2008 in this category are reported to be 16,639 Gg in the 2011 submission, while they were reported to be 40,769 Gg in the 2010 submission). However, according to table 91 in the NIR submitted in 2011, if those emissions allocated to the energy sector after this recalculation are also taken into account, the total CO<sub>2</sub> emissions from use of reducing agents are calculated to be 47,866 Gg in 2008, which is 10 per cent above the 2008 value in the 2010 submission. In response to questions raised by the ERT during the review, Germany explained that the difference is caused by an overestimation of CO<sub>2</sub> emissions in the 2011 submission because of an overestimated net calorific value of blast furnace gas in the national statistics. Germany further informed the ERT that there is an ongoing discussion with the Federal Statistical Office and the steel industry to improve the data. Having noted this information, the ERT recommends that Germany use the data improved through this discussion when calculating and reporting CO<sub>2</sub> emissions from this category in its next annual submission. The ERT also recommends that, in its next NIR, Germany provide a transparent explanation of the recalculation, namely what was wrong with the data previously used and how the data have been improved.

#### Production of halocarbons and SF<sub>6</sub> – HFCs

64. This category has been identified as a key category according to both level and trend assessment. According to the NIR, this category includes: by-product emissions of HFC-23 from the production of HCFC-22; fugitive emissions of HFC-134a; fugitive emissions of HFC-227ea. All these emissions are calculated on the basis of data obtained from plant operators, but reported only in an aggregated form in the fugitive emissions subcategory

because the data obtained from plant operators are confidential. Emissions of HFCs from this category decreased by 82.3 per cent from the base year to 2009. Because of the confidentiality, only some qualitative information is given in the NIR to explain the emission trend for this category, which inevitably leads to a lack of transparency to some extent. In response to questions raised by the ERT during the review, Germany provided the ERT with temporary access to the confidential data used to calculate HFC emissions from this category. The ERT checked the data and verified the trend. The ERT recommends that, in the next NIR, Germany improve the explanation of the emission trend by including the information on the cessation of HCFC-22 production and any other relevant new information.

#### Consumption of halocarbons and SF<sub>6</sub> – HFCs, PFCs and SF<sub>6</sub>

65. The ERT noted that Germany has developed detailed data collection procedures for the calculation of actual emissions of HFCs, PFCs and SF<sub>6</sub> and continues its efforts to further improve the quality of emission estimates. For example, the whole of this category was evaluated in a voluntary trilateral review in February 2011, where experts from the United Kingdom of Great Britain and Northern Ireland, Germany and Austria reviewed the chapters of the respective countries. Germany explains in the NIR that ideas resulting from this informal and voluntary review will be used to further improve the model on which calculations are based wherever possible. The ERT welcomes this effort, and recommends that Germany improve the documentation in the NIR of the trilateral review and its results with respect to the German fluorinated gases (F-gases) inventory in its next annual submission.

### **3. Non-key categories**

#### Limestone and dolomite use – CO<sub>2</sub>

66. Germany continues to report CO<sub>2</sub> emissions from limestone and dolomite use as “included elsewhere” (“IE”) and explained the merits of category-specific calculation and reporting of emissions (e.g. under iron and steel production or flue gas desulphurization). In view of the fact that Germany’s approach is not fully in line with the Revised 1996 IPCC Guidelines, the ERT reiterates the recommendation in the previous review report to the effect that Germany report CO<sub>2</sub> emissions in accordance with the Revised 1996 IPCC Guidelines, or make efforts to do so by giving further analysis and consideration to this issue. Also, the ERT encourages Germany to present a table showing the aggregated CO<sub>2</sub> emissions from the major components of the category limestone and dolomite use (namely, flue gas desulphurization in public power stations as well as iron and steel production) for information purposes in the relevant chapter in the NIR, even if it continues to include those emissions under the respective end-use categories in the actual inventory reporting (i.e. in the CRF tables and in the key category analysis). In response to the draft review report, Germany informed the ERT that an overview of limestone and dolomite use is included in its 2012 submission.

#### Other (industrial processes) – SF<sub>6</sub>

67. Various categories emitting SF<sub>6</sub> are reported under this category for reasons of confidentiality. The ERT noted that the recalculation of SF<sub>6</sub> emissions reported in this category resulted in a decrease of 2,418.68 Gg CO<sub>2</sub> in 2008. In response to questions raised by the ERT, Germany explained that the main reason for this reduction is the change of the EF for SF<sub>6</sub> from aluminium foundries in Germany based on measurements reported in 2010 by the plant using SF<sub>6</sub> since 1999. There is no explanation provided in the chapter on this category in the NIR, although this change of EF is mentioned in the chapter on SF<sub>6</sub> used in aluminium and magnesium foundries. In order to improve the transparency, the ERT

recommends that Germany provide sufficient explanation of the reasons for any recalculations of emissions reported under other (industrial processes) in the relevant chapter in the NIR in its next annual inventory submission.

## **D. Agriculture**

### **1. Sector overview**

68. In 2009, emissions from the agriculture sector amounted to 72,702.19 Gg CO<sub>2</sub> eq, or 7.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 16.2 per cent. The key driver for the fall in emissions is the decrease in the animal population. Within the sector, 59.8 per cent of the emissions were from agricultural soils, followed by 28.8 per cent from enteric fermentation. The remaining 11.4 per cent were from manure management.

69. Germany has made recalculations for the agriculture sector between the 2010 and 2011 submissions in response to the 2010 annual review report and following changes in AD and input parameters and in order to rectify identified errors. The impact of these recalculations on the agriculture sector was a decrease in emissions of 3.8 per cent for 2008. The main recalculations took place in the category agricultural soils (6.5 per cent decrease) due to revised AD for the amount of nitrogen (N) from applied fertilizer, manure applied, grazing and crop residues, leaching and surface runoff and sewage sludge. CRF table 8(b) explains the recalculations conducted.

70. The 2011 annual submission of Germany is complete for the agriculture sector. The transparency has been improved since the last submission, for example by improving the documentation of the EFs used for estimating CH<sub>4</sub> from manure management. The ERT acknowledges that, following the recommendation of the previous review report, Germany has included as part of its 2011 submission a separate, more detailed report describing the inventory calculations used for the agriculture sector, namely “Special Issue 342 Calculations of gaseous and particulate emissions from German agriculture 1990–2009”. The ERT commends Germany for the improvement.

71. However, alongside the implementation of some of the recommendations of the previous review report, the ERT noted one recommendation that Germany had failed to implement, namely to use the EFs from the IPCC good practice guidance until it has finished the national work on justifying its use of default EFs from the 2006 IPCC Guidelines by demonstrating that the EFs contained in these guidelines better represent national circumstances and country-specific conditions (see para. 76 below).

### **2. Key categories**

#### Enteric fermentation – CH<sub>4</sub>

72. Germany estimates CH<sub>4</sub> emissions from enteric fermentation using a tier 2 method for cattle and swine. For all other animal types a tier 1 method is used, which is in line with the IPCC good practice guidance. The MCF used for dairy cows has been changed to the IPCC default value of 6.0 per cent in response to recommendations in the 2010 annual review report. Recalculations have also been made in daily weight estimates from 1999 for fattening bulls due to a change in data source, and the average gross energy intake estimates for suckling cows and fattening pigs have been changed due to earlier calculation errors. The ERT welcomes these improvements in the estimations of emissions from enteric fermentation.

Manure management – CH<sub>4</sub><sup>10</sup>

73. Germany uses a tier 2 method for calculating CH<sub>4</sub> emissions from manure management for all animal types except for geese where, according to the NIR, the default EF for poultry is used.

74. During the previous review, it was noted that stable type distribution in Germany has not been updated since 1999 and Germany was recommended to provide detailed information on stable type distribution and surface cover or manure stores, as well as on amount of biogas treated manure. During the current review Germany informed the ERT that in the year 2010 a new agricultural census was carried out by the Federal Statistical Office (LZ2010) and the results of this census concerning stable type distribution, pasture times and storage type distribution will be included in its annual submission for 2012 together with the results of another survey concerning the application of animal manure. The ERT welcomes this progress and reiterates the recommendation from the previous review report that Germany update its stable type distribution and storage times for the different manure and livestock types, and define and justify the EFs used for each stable type and to report thereon in its next annual submission. In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.

Manure management – N<sub>2</sub>O

75. The N excretion rate for dairy cattle (131.5 kg N/head/year) for 2009 is the highest reported by Parties (range 68–131.5 kg N/head/year) and above the IPCC default range (60–100 kg N/head/year). During an internal review, Germany found that the N excretion rates used for dairy cattle are too high due to an overestimation of the N content in the feed. The ERT recommends that Germany correct this in its next annual submission. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

76. The ERT noted that Germany continues to use the EFs from the 2006 IPCC Guidelines for N<sub>2</sub>O emissions from storage of manure in liquid systems and solid storage and dry lot. The use of default EFs from the 2006 IPCC Guidelines results in N<sub>2</sub>O IEFs for solid storage and dry lot (0.0052–0.0059 kg N<sub>2</sub>O-N/kg N) of Germany which are among the lowest reported by Parties (range 0.002–0.025 kg N<sub>2</sub>O-N/kg N) and below the IPCC default (0.02 kg N<sub>2</sub>O-N/kg N). The previous review report recommended that Germany review its reasoning and justification for the use of default EFs from the 2006 IPCC Guidelines and develop more scientifically justified country-specific EFs for inclusion in the agricultural inventory. The ERT notes that the country-specific studies in the manure management area are in progress and that the tentative results from these studies for the country-specific EFs are even lower than the 2006 IPCC Guidelines default values. The ERT recommends that Germany, in its next annual submission, apply well-documented country-specific EFs based on the results from the national studies or recalculate the emissions by using the EFs from the Revised 1996 IPCC Guidelines (table 4-22) following the methodology outlined in the IPCC good practice guidance until it is able to apply the country-specific EFs.

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<sup>10</sup> Part of the CH<sub>4</sub> and N<sub>2</sub>O emissions from manure management have been identified as key categories solely via the tier 2 approach conducted by the Party.

## E. Land use, land-use change and forestry

### 1. Sector overview

77. In 2009, net emissions from the LULUCF sector amounted to 17,563.34 Gg CO<sub>2</sub> eq. There has been a transition from a net sink in the base year to a net source in 2009, representing a change of 156.3 per cent. The key driver for the transition is the fall in removals by the forestry sector due to increased harvests and a decreased increment associated with the age-class structure shifts in the category forest land remaining forest land. The NIR also mentions the increase in emissions from grassland as a key driver of the sectoral trends. Within the sector, 25,371.33 Gg CO<sub>2</sub> eq were removed from forest lands, while 27,409.84 Gg CO<sub>2</sub> eq of the net emissions were from cropland, 10,720.85 Gg CO<sub>2</sub> eq from grassland and 2,408.29 Gg CO<sub>2</sub> eq from wetlands. The remaining net emissions of 2,395.69 Gg CO<sub>2</sub> eq were from settlements and other land.

78. The Party has made recalculations for the LULUCF sector between the 2010 and 2011 submissions in response to recommendations made in the previous review report. The impact of these recalculations on the LULUCF sector is a net decrease in emissions of 49.6 per cent for 2008. The main recalculations took place in the following categories:

(a) The LUM for the entire LULUCF sector: changes in the areas led to changes in the relevant correlated emissions for all land-use categories;

(b) Forest lands: a 9.0 per cent increase in removals due to corrections to a biomass calculation error, correction of the organic soil EF and a change of the transition time for litter to reach steady state from 100 to 40 years (following a recent study);

(c) Grassland: a 61.5 per cent decrease in emissions due to the reallocation of "other wooded land", which had previously been allocated to other lands, into the grassland category and updated data on areas;

(d) Settlements: a 72.3 per cent decrease in emissions due to a lower value for the area according to the new LUM.

79. Most of the recalculations are well justified. However, the information was considered insufficient in the case of grassland. The ERT recommends that Germany transparently document the reasons for and impact of any recalculations in all categories in its next annual submission. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

80. Emissions/removals for the main categories within the LULUCF sector are reported. However, some categories are reported as "not estimated" ("NE"), such as emissions of N<sub>2</sub>O from drainage of mineral soils and flooded wetlands. In response to questions raised by the ERT during the review, Germany explained that it is not good practice to drain forest soils and this is not practised in the country. The ERT recommends that Germany consider the use of the notation key "not occurring" ("NO") for mineral soils and provide relevant background information in its next annual submission. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

81. The ERT acknowledges the modifications to the NIR, which improved the transparency of how estimates are derived and the justification of assumptions (e.g. data on mineral soils). However, the ERT concluded that further clarification is required to improve transparency, in particular, an explanation of the fluctuations in emissions/removals and justification of the assumptions on carbon stock changes used for the reporting of mineral soils.

82. Carbon stock changes in mineral soils are derived from country-specific factors documented in the NIR. The previous review report highlighted the need to improve these approaches. The ERT acknowledges the recent improvement for the estimation of soil carbon stock changes. Germany has justified the assumption of small changes in carbon stock for mineral soils for the category forest land remaining forest land using the database from the “Bodenzustandserhebung im Wald” (BZE) survey of soil condition in forests. However, the ERT notes that no confidence interval, statistical test of significance or probability have been conducted to test whether these estimated changes are “real” (i.e. is the IEF significantly different from zero). Moreover, there is no uncertainty analysis presented for mineral soils carbon stock change despite the large body of work presented to show mineral soils carbon stocks. The ERT recommends that the Party further justify the estimated changes and provide uncertainty estimates for carbon stock changes in its 2013 submission.

83. The NIR states that the country-specific EFs for organic soil for drainage for all categories, apart from forest land remaining forest land and lands converted to forest land, were derived by the Johann Heinrich von Thünen-Institut, without providing sufficient further documentation. The country-specific EFs vary from 0, for wetlands, to 11 t C/ha/year, for cropland. Although data sources and references are provided in the NIR, the ERT encourages the Party to provide a more detailed and transparent description of the methodology in the next annual submission.

84. The main issue identified during the previous review of the sector was linked to the identification of land use and land-use categories. The ERT acknowledges the improvements made to the inventory to address previously identified problems with the inconsistent representation of land areas for different activities and time series. In the 2011 submission, Germany transparently documented the new land use tracking system and recalculated emissions/removals to take account of the transition in the reporting system. In addition, land use in the period 1990–2000 has been reconstructed and recalculated to ensure time-series consistency. Germany has also implemented an action plan to ensure consistent representation of areas across activities and time series. Following a previous recommendation, a new QA/QC action plan has been included in the NIR and institutional agreements between collaborating bodies have been agreed. A detailed inter-institutional map has been designed to highlight data flows, responsibilities, timelines for data delivery and cross-checking procedures to be carried out by each partner. The ERT welcomes this development.

85. Although most previous recommendations have been addressed by the Party, the ERT concluded that some of the previous recommendations are still pending. Thus, Germany is still using a country-specific transition time of one year for soils, resulting in an apparent instant emission. It is also not transparent whether the stock changes used to calculate the stock changes for soils from forests land to other subcategories is done using a 20-year or one-year transition time. Based on the information received from the Party during the review, the ERT concluded that the application of the one-year transition does not underestimate the emissions from deforestation or other land-use transitions for 2009, because the annual rate of deforestation or other land transitions is constant over the entire time series. However, planned improvements in the sector could result in variations in the annual rates of deforestation. Therefore, the ERT agrees with previous reviews that the country-specific transition time of one year is not appropriate because it is not possible for the soils to reach the new equilibrium within one year, and, therefore, reiterates the recommendation in the previous review report that Germany change its methodology either to the default linear methodology, in line with the IPCC good practice guidance for LULUCF, or develop a country-specific model taking into account national circumstances. In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.



86. In addition, Germany still reports only one subdivision for the wetland category. The ERT reiterates the recommendation in the previous review report that Germany include subdivisions, such as extracted peatlands and natural or re-established wetlands, to improve transparency. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

## 2. Key categories

### Forest land remaining forest land

87. The net CO<sub>2</sub> sink over the time series for forest land remaining forest land shows a marked decrease in removals from -70,500.51 Gg in 2001 to -20,743.56 Gg in 2002. This sudden decrease is intrinsic to the stock change approach used by the Party for biomass for two consecutive time intervals. In addition, the Party explained that this decrease is due to an increase in harvesting and a decrease in the gross increment due to the uneven and changing age-class distribution. The Party reported that gross increment before 2002 can be calculated only for the states of the former West Germany and that there are no comparable values representing the change in the increment for the whole of Germany. The Party indicated that part of the time series will be recalculated when the results for the third national forest inventory (2012) become available, which is assumed to be in time for inclusion in the 2013 annual submission.

88. Litter stock changes in forest land remaining forest land are reported to stay constant and not change in forest land remaining forest land (tier 2 method) because proved stock changes from 1990 to 2006 using data from the BZE II survey and the project BioSoil<sup>11</sup> were not significantly different from zero for forest land remaining forest land. The ERT accepts the methodological approach undertaken, but raises the issue of testing for significance to see if calculated differences in litter or soil stocks over time are in fact insignificant. The Party demonstrates that the stock changes for litter in forest land remaining forest land are not significant, based on Students t tests. However, this type of analysis is not performed for soil. Thus, this would represent a methodological inconsistency for different pools. The ERT encourages the Party to apply significance testing to carbon stock changes for both litter and soil pools.

## F. Waste

### 1. Sector overview

89. In 2009, emissions from the waste sector amounted to 11,759.78 Gg CO<sub>2</sub> eq, or 1.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 72.7 per cent. The key driver for the fall in emissions is an increase in waste recycling and the ban on sending biodegradable waste to landfill, affecting the category solid waste disposal on land. Within the sector, 72.0 per cent of the emissions were from solid waste disposal on land, followed by 20.3 per cent from wastewater handling and 7.8 per cent from other (waste).

90. Germany has made recalculations for the waste sector between the 2010 and 2011 submissions in order to rectify identified errors and improve AD. The impact of these recalculations on the waste sector is a decrease in emissions of 0.2 per cent for 2008. The main recalculations took place in the following categories:

(a) Other (CH<sub>4</sub> and N<sub>2</sub>O from composting): a 2.1 per cent decrease due to improved AD;

<sup>11</sup> United Nation's Economic Commission for Europe BioSoil Demonstration Project.

(b) Domestic and commercial wastewater (CH<sub>4</sub> and N<sub>2</sub>O): to correct discrepancies between the AD reported in the NIR and the figures according to the Federal Statistical Office for the years 2006–2008.

91. The recalculations for solid waste disposal on land made as part of the 2010 review were implemented in a consistent manner in the 2011 submission.

92. In general, information in the NIR and the CRF tables is transparent and complete. However, the ERT noted that the explanation of country-specific methodologies, particularly on mechanical-biological waste treatment (MBT), was limited and ambiguous. In addition, the widely used notation key “NO” (see paras. 99 and 100 below) is not always adequately justified within the NIR, such as in the case of industrial wastewater treatment (emissions and recovery). The ERT recommends that the Party include recovery to allow cross-checks with the data reported in the energy sector or, at a minimum, use the correct notation key “IE” with the relevant explanation in its next annual submission.

93. The ERT concluded that the methodologies used were in line with the IPCC good practice guidance and consistent across the time series. The assessment of uncertainties was completed for all categories. Category-specific quality checks have been implemented in all categories.

94. The ERT welcomes the improvement of the 2011 inventory following the recommendations of the previous review report, namely the improvements in transparency and AD. However, the ERT noted that there is still room for improvement in the reporting of CH<sub>4</sub> recovery, as recommended by the previous review report, and to the justification that the value of the MCF used in the estimates for domestic wastewater treatment represents the country-specific conditions.

## 2. Key categories

### Solid waste disposal on land –CH<sub>4</sub>

95. CH<sub>4</sub> emissions from solid waste disposal on land was the key category by level and trend assessment which, in 2009, amounted to 8,463.00 Gg CO<sub>2</sub> eq, a reduction of 78.1 per cent since the base year. Germany used the IPCC first-order decay multiphase method to estimate CH<sub>4</sub> emissions from solid waste disposal on land. Estimation has been improved since the previous submission, and now includes MBT residues sent to landfill and using recovery data collected from landfill, and AD and EFs were transparently presented. However, the ERT noted that reported data on emissions and recovery for 2009 are provisional and will be replaced in the next annual submission. The ERT noted that in some cases, particular for paper and cardboard, Germany still uses IPCC default values and recommends that Germany increase its efforts to develop country-specific values for degradable organic carbon (DOC) for its next annual submission.

96. The ERT found inconsistencies between the NIR and CRF table 6.A as in the multiphase model DOC changes according to the composition of the waste applied to landfill, while a constant value of 0.5 for the whole time series is reported in the additional information in CRF table 6.A. The ERT recommends that Germany strengthen its quality checks before submitting its next annual submission.

97. The ERT welcomes the plan of the Federal Statistical Office to collect data on the collection and use of landfill gas from landfills in their after-closure phase in a consistent manner and encourages Germany to report associated emissions in its 2012 submission.

Wastewater handling – CH<sub>4</sub>

98. CH<sub>4</sub> emissions from domestic and commercial wastewater are calculated for inhabitants connected to cesspools/septic tanks using the Revised 1996 IPCC Guidelines default method. In its 2011 submission, Germany continues to use an MCF of 0.5 based on the value used by other countries (United States of America and Czech Republic). Since the MCFs for septic tanks and cesspools can be different due to country-specific circumstances, the ERT recommends that Germany increase its efforts to develop a country-specific value for MCF for cesspools and septic tanks as appropriate for a key category, or include further justification on the values used in the NIR of its next annual submission. The ERT noted that domestic wastewater treatment plants in Germany use the aerobic system and no emissions were estimated.

99. The ERT noted that CH<sub>4</sub> emissions from industrial wastewater are reported as “NO” in the CRF tables and the underlying documentation in the NIR is insufficient. During the review, in response to questions raised by the ERT, Germany provided detailed information on the amount and types of industrial wastewater. The ERT reiterates the recommendation from the previous review report that Germany improve its reporting by providing more details on the treatment of industrial wastewater in Germany and justify its reporting that no CH<sub>4</sub> emissions are produced in the process.

**3. Non-key categories**Waste incineration – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

100. Based on the national legislation, waste incineration in Germany is used for energy purposes only and, therefore, emissions were reported in the energy sector under public electricity and heat production and reported as “NO” in the waste sector. In response to questions raised by the ERT during the review, Germany provided information on the incineration types and capacity, stating that there are 70 plants for municipal waste incineration, 28 plants for refuse-derived fuel and 5 plants under construction. Hazardous waste and medical waste are treated with municipal incineration. Germany also further clarified that nitrogen oxides (NO<sub>x</sub>), NMVOCs and sulphur dioxide (SO<sub>2</sub>) reported under waste incineration are from cremation. The ERT reiterates the recommendation in the previous review report that Germany describe in more detail the information on incineration plants in the country, including information on cremation, in its next annual submission. The ERT further recommends that Germany consider revision of the notation key “NO” in the CRF tables and include information on cremation in the documentation boxes of the CRF tables.

**G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol****1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**Overview

101. Germany has reported information on Article 3, paragraph 3, (afforestation, reforestation and deforestation) and on forest management that it has elected under Article 3, paragraph 4, of the Kyoto Protocol. Germany chose to account for activities under Article 3, paragraphs 3 and 4, at the end of the first commitment period. Germany followed a recommendation in the previous review report to develop methodologies for the construction of the new LUM and new soils information, which resulted in changes to the national system. The ERT concluded that the reported information is now in line with the

requirements of the IPCC good practice guidance for LULUCF and the annexes to decisions 15/CMP.1 and 16/CMP.1. The Party has also implemented an action plan to ensure consistent representation of land areas, continued improvement to soil estimates and improved QA/QC systems as requested in the previous review report.

102. The implementation of the new LUM and the improvement to the national system for identification and representation of the area for the KP-LULUCF activities now ensures that these land areas are identifiable and the detection limit (0.1 ha) of the new LUM tracking system is consistent with the forest definition. During the review, in response to questions raised by the ERT, the Party clarified that the detection limit of the tracking system (GSE Forest Monitoring) is 0.5 ha, but the initial data resolution is 0.1 ha. The Party, therefore, provides documentation in the NIR 2011 on priority conditions and the hierarchy of land-use classification to ensure that activities accounted for under Article 3, paragraph 4, are not accounted for under Article 3, paragraph 3. This is consistent with the requirements under paragraph 9(c) of the annex to decision 15/CMP.1.

103. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report in order to rectify identified errors and consistently represent land area transitions subject to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The impact of these recalculations for the KP-LULUCF activities was an increase in removals by –265.5 per cent for 2008. The main recalculations took place in the following categories:

(a) Afforestation and reforestation: removals in afforestation and reforestation land not harvested have increased by 71.2 per cent due to corrections made to the biomass increment calculations and an increase in litter carbon stock changes due to methodological adjustments;

(b) Deforestation: deforested areas have decreased from 174.2 to 132.5 kha and the net IEF for all pools due to deforestation activities has decreased from 94.15 to 8.12 Mg CO<sub>2</sub>/ha for 2008. The different areas and EFs used in the 2011 submission have resulted in a decrease in CO<sub>2</sub> emissions from deforestation, from 16,393.32 to 1,076.04 Gg in 2008 (overall decrease of 93.4 per cent for the category);

(c) Forest management: changes to the LUM and a small increase in managed forests only resulted in an increase of 1.1 per cent for removals from forest management.

104. The recalculations are explained in the NIR. However, the ERT considers that further clarifications are needed to justify the applied recalculations, in particular to explain how the revision to the biomass increment could increase the net CO<sub>2</sub> removals per hectare from 6.20 to 13.20 Mg CO<sub>2</sub>/ha in 2008, especially considering that the areas of afforestation and reforestation decreased from 422.4 to 339.2 kha in 2008. The response received from the Party during the review was not sufficient to explain the change in the IEF, and the ERT, therefore, recommends that Germany provide a transparent explanation and justification of the recalculation in its next annual submission.

105. The Party clearly demonstrated the relationship between forest lands under the Convention and the KP-LULUCF activities and applied consistently the same methodologies and areas across the categories. The ERT acknowledges these improvements and commends the Party on transparently documenting these relationships.

106. Although Germany has made significant improvements to the reporting of carbon stock changes in mineral soils, the ERT encourages the Party to make additional improvements in its next annual submission (see paras. 81 and 82 above).

107. An uncertainty analysis has been presented for the LULUCF sector, but there is no information on uncertainties for KP-LULUCF activities, which should be provided in accordance with decision 17/CMP.1. For example, the ERT cannot assess uncertainties

associated with deforestation activities from the information supplied. The ERT encourages the Party to submit a separate analysis for each activity of KP-LULUCF to improve transparency and assist in the identification of categories which require improvements.

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

##### *Afforestation and reforestation – CO<sub>2</sub>*

108. Carbon stock changes in dead wood are reported as “NO” (tier 1) in afforestation and reforestation lands not harvested. The Party assumes that dead wood with a diameter greater than 10 cm would not be present in this forest category. However, considering that this is a key category and that natural mortality is likely to occur in these forests, the ERT recommends that the Party: provide information that carbon stock changes in dead material with a diameter of less than 10 cm are included in the litter pool; or develop a method to report changes in the dead wood pool by analysis of the existing national forest inventory (NFI) data; or choose not to account for this pool if transparent and verifiable information is provided that the pool is not a net source, in line with the requirements set out in paragraph 6(e) of the annex to decision 15/CMP.1. In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.

109. Carbon stock changes in mineral soils have been reported based on country-specific estimates documented in the NIR. These carbon stock changes for some land-use transitions into forest are very low, varying from emissions of 0.03 Mg/ha/year to removals of 0.53 Mg/ha/year. In the absence of any statistical hypothesis testing and uncertainty analysis for mineral soils, the ERT questions whether these calculated changes are significantly different from zero (see para. 82 above). Although the application of these soil EFs is conservative and does not underestimate emissions or overestimate removals, the ERT recommends that the Party reassess the methodological approach or provide statistical justification for these changes. Alternatively, the Party may choose not to account for the pool if it can be demonstrated that is not a net source, in line with the requirements set out in paragraph 6(e) of the annex to decision 15/CMP.1.

##### *Deforestation – CO<sub>2</sub>*

110. Germany still uses the one-year transition period for soils subject to deforestation, which is not in line with the IPCC good practice guidance for LULUCF and may represent an underestimation of emissions in future submissions (see para. 85 above). The ERT reiterates the recommendation in the previous review report that Germany reassess the method used for reporting carbon stock changes in soils under deforestation activities. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

111. In the 2011 submission, Germany reports on a decrease in the net IEF for 2008 (all pools) from 94.15 to 8.12 Mg CO<sub>2</sub>/ha for net emissions associated with deforestation (see para. 103(b) above). The new IEF is comparable with that of neighbouring reporting Parties. During the review, the Party explained that information in its previous submission was based on the assumption that deforestation occurs in ‘normal’ forests, so the mean biomass carbon stock was used to calculate losses. However, following analysis of 455 NFI plots, the Party indicated that biomass in deforestation plots was considerably lower than the national average. The ERT concluded that these changes are in line with the IPCC good practice guidance for LULUCF. The ERT recommends that Germany include transparent documentation on the reasons for these recalculations in its next annual submission.

Activities under Article 3, paragraph 4, of the Kyoto Protocol*Forest management – CO<sub>2</sub>*

112. Carbon stock changes in mineral soils and litter in managed forests have been reported as “NO”. The carbon stock change in litter has been demonstrated not to be significantly different from zero. The Party provides verifiable and transparent information showing that, using the BZE survey data, mineral soils do not represent a net source. However, the Party also states that (section 7.2.4.4.1 of the NIR) analysis of the second soil survey is being conducted with a view to demonstrating that this pool is not a source. The ERT recommends that the Party include information on the progress or results of this survey in the next annual submission.

**2. Information on Kyoto Protocol units**Standard electronic format and reports from the national registry

113. Germany has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF comparison report.<sup>12</sup> The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

114. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88(a-j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1.

115. Information reported by the Party on records of any discrepancies and on any records of non-replacement was found to be consistent with information provided to the secretariat by the ITL.

National registry

116. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

Calculation of the commitment period reserve

117. Germany has reported its commitment period reserve in its 2011 annual submission. Germany reported that its commitment period reserve has not changed since the initial

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<sup>12</sup> The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

report review (4,381,287,024 t CO<sub>2</sub> eq.) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

### **3. Changes to the national system**

118. Germany provided information on changes to its national system in its annual submission regarding an expiration of the relevant legal basis for data collection for the iron and steel industry, and changes in the agriculture and LULUCF sector (see para. 120 below). The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

119. During the review, Germany informed the ERT that in June 2011, a voluntary commitment between the German Steel Federation, BMWi and UBA has been signed to ensure the annual exchange of all data needed for the reporting for the iron and steel sector. The ERT welcomes this development and recommends that Germany take steps to ensure that the time-series consistency will be maintained in the next annual submission. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

120. The changes in the national system in the agriculture and LULUCF sectors are not clearly addressed in chapter 13 of the NIR, where only a reference is included to the action plan (which describes the strengthened cooperation between the single national entity and other federal institutions and non-governmental organizations), which references other parts of the NIR for a description on the national system of the agriculture and LULUCF sectors. During the review, the ERT confirmed that the changes made have strengthened the national system. However, the ERT recommends that Germany clearly summarize the exact changes to the national system in the relevant chapter, as necessary, in its next annual submission. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

### **4. Changes to the national registry**

121. Germany provided information on changes to its national registry in its annual submission. Germany reported the changes in the national registry related to the database/the capacity of the national registry; conformity to technical standards; and discrepancies and security procedures. The ERT concluded that, taking into account the confirmed changes in the national registry, Germany's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). The ERT recommends that the Party report in its next annual submission any change(s) in its national registry in accordance with chapter I.G of the annex to decision 15/CMP.1. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

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

122. Germany reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, in its 2011 annual submission, but it did not identify the changes in its reporting compared with that in its previous annual submission in accordance with decision 15/CMP.1. The ERT recommends that Germany include such information in its next annual submission. In response to the draft review report, Germany informed the ERT that this recommendation is addressed in its 2012 submission.

123. The information in chapter 15 of the NIR is the same as that given in the 2010 annual submission and lists the cross-sectoral and sectoral measures and their possible effects (mainly indirect) on developing countries. Only the promotion of biofuels is assessed as potentially having a negative indirect effect on developing Parties, while all other policies and measures are assessed to have no impact or a positive impact on those Parties. In response to questions raised by the ERT during the review regarding the previous recommendation that Germany include more detailed information of the adverse impacts, including the impacts of the policies and measures of the EU, Germany informed the ERT that this information was provided during the review of its fifth national communication in June 2011 and that this will be included in its next annual submission, as appropriate. The ERT welcomes this plan.

124. The ERT concluded that the information provided in the NIR is not fully complete and transparent and recommends that the Party, in its next annual submission, report any changes in its information provided under Article 3, paragraph 14, and include more information on specific policies implemented and measures undertaken, their impact and how the Party gives priority in its policies, actions and projects according to the annex to decision 15/CMP.1, paragraph 24(a–f). In response to the draft review report, Germany informed the ERT that the recommendation is addressed in its 2012 submission.

### **III. Conclusions and recommendations**

125. Germany made its annual submission on 15 April 2011. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

126. The ERT concludes that the inventory submission of Germany has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as complete in terms of categories and gases.

127. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been generally prepared and reported in accordance with decision 15/CMP.1. The ERT commends the Party for the improvement in the reporting of the KP-LULUCF activities.

128. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT noted that the reporting of CO<sub>2</sub> emissions from limestone and dolomite use is not fully in line with the Revised 1996 IPCC Guidelines (see para. 66 above).

129. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD, EFs and in order to rectify identified errors. The impact of these recalculations on the national totals is a decrease in emissions of 0.3 per cent for 2008. The main recalculations took place in the following sectors/categories:

- (a) CO<sub>2</sub> emissions from stationary combustion;
- (b) CO<sub>2</sub> emissions from metal production and SF<sub>6</sub> emissions from other (2G);



- (c) N<sub>2</sub>O emissions from agricultural soils;
- (d) LULUCF sector in general.

130. The Party has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol and elected activities under Article 3, paragraph 4, of the Kyoto Protocol generally in a complete and transparent manner and in line with the requirements of the IPCC good practice guidance for LULUCF and the annexes to decisions 15/CMP.1 and 16/CMP.1.

131. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

- (a) 71.2 per cent increase in net removals from afforestation/reforestation;
- (b) 93.4 per cent decrease in net emissions from deforestation;
- (c) 1.1 per cent increase in net removals from forest management.

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

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

134. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

135. Germany has reported information under chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. The information was provided on 15 April 2011 as part of the 2011 submission. The ERT concluded that the information is not fully complete and transparent. In response to the draft review report, Germany informed the ERT that this issue is addressed in its 2012 submission (see para. 124 above).

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

- (a) Implementation of a key category analysis with qualitative criteria, and documentation of the criteria used (para. 18 above);
- (b) Provision of justifications of the time-series consistency where, for example, data collection procedures have changed, availability of AD is limited in the earlier years, or different methods are used over time (e.g. paras. 14 and 50 above);
- (c) Provision of sufficient explanation of the reasons for any recalculations of emissions and particularly their impacts (e.g. para. 22 above);
- (d) Further improvement of the description of the underlying rationale for country-specific EFs applied, especially for key categories (e.g. para. 26 above);
- (e) Inclusion in the NIR of the information on the results of QA/QC procedures, for example, checking inconsistencies between the NIR and CRF tables and any other errors in reporting (e.g. para. 24 above);
- (f) Provision of information on changes in, and more detailed information on, the activities for the minimization of the adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, and their prioritization (para. 124 above).

137. In the course of the review, the ERT formulated a number of recommendations relating to the transparency of background and methodological information (e.g. in the energy, agriculture and waste sectors), justification and documentation of recalculations (e.g. in the energy, industrial processes and LULUCF sectors), justification of methodological choices (e.g. the KP-LULUCF sector) presented in Germany's annual submission. The key sectoral recommendations are that Germany:

- (a) Provide sufficient information on the methodologies used for estimating emissions for iron and steel production as well as on what QA/QC procedures are in place to ensure that no omissions or double counting of emissions occurs (energy);
- (b) Improve the timeliness of reporting of the NEB (energy);
- (c) Improve the documentation in the NIR of the voluntary trilateral review among the United Kingdom, Germany and Austria, and explain its results with respect to the German F-gases inventories (industrial processes);
- (d) Use the EFs from the IPCC good practice guidance until country-specific EFs are available for N<sub>2</sub>O emissions from manure management, correct the overestimation of the N excretion rates used for dairy cattle and update the stable type distribution and storage times for the different manure and livestock types (agriculture);
- (e) Revise the methodology for carbon stock changes for mineral soil by including statistical hypothesis testing on the significance of carbon stock changes in soil in managed forests and forest land remaining forest land, or further justify that the soil pool is not a source (LULUCF, KP-LULUCF);
- (f) Revise the methodology used for calculating carbon stock changes in soils following conversions of forest to other land uses or justify that these changes occur within one year following the land-use transition (LULUCF, KP-LULUCF);
- (g) Improve the documentation on the uncertainty analysis by providing in the NIR the information on uncertainties for AD and EF at a source/sink activity level for KP-LULUCF activities;
- (h) Provide justifications for the use of parameters and notation keys, implement efforts to develop category-specific data and improve the transparency of reporting on the industrial wastewater treatment and waste incineration practices (waste).

#### **IV. Questions of implementation**

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

## Annex I

### Documents and information used during the review

#### A. Reference documents

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

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

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

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

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

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

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

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

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

Status report for Germany 2011. Available at <http://unfccc.int/resource/docs/2011/asr/deu.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <http://unfccc.int/resource/webdocs/sai/2011.pdf>.

FCCC/ARR/2010/DEU. Report of the individual review of the greenhouse gas inventory of Germany submitted in 2010. Available at <http://unfccc.int/resource/docs/2011/arr/deu.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at [http://unfccc.int/kyoto\\_protocol/registry\\_systems/independent\\_assessment\\_reports/items/4061.php](http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php).

## B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Michael Strogies (Federal Environment Agency), including additional material on the methodology and assumptions used. The following documents<sup>1</sup> were also provided by Germany:

Ziegler et al.: “Ansatzpunkte und Potentiale zur Minderung des Treibhauseffektes aus Sicht der fossilen Energieträger”, Deutsche Wissenschaftliche Gesellschaft für Erdöl, Erdgas und Kohle e. V., 1992, Forschungsbericht 448-2.(copy of several pages)

Spreadsheets:

Unsicherheiten Table 6\_1\_1A (uncertainties)

6B2\_FV-QKV-FAP-NIRK\_CH4N2O\_AREFED\_05092011 (quality checklist)

1\_Tab\_Abfalldaten\_household-waste data\_NIR\_2011

2\_Tab\_Abfallverbrennungsanlagen\_2011-01-14

4\_Tab\_EBS (RDF)-Kraftwerke\_2010-12-22

6\_Tab\_Sonderabfallverbrennungsanlagen\_2010-12-22

RÖSEMANN et al. 2011: Emissions from German Agriculture – National Emission Inventory Report (NIR) 2011 for 2009 – Methods and data. vTI Agriculture and Forestry Research (Landbauforschung), Special Issue (Sonderheft) 342, 2011

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<sup>1</sup> Reproduced as received from the Party.

## Annex II

### Acronyms and abbreviations

|                    |                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AD                 | activity data                                                                                                                                                                                                |
| CH <sub>4</sub>    | methane                                                                                                                                                                                                      |
| CO <sub>2</sub>    | carbon dioxide                                                                                                                                                                                               |
| CO <sub>2</sub> eq | carbon dioxide equivalent                                                                                                                                                                                    |
| CRF                | common reporting format                                                                                                                                                                                      |
| DOC                | degradable organic carbon                                                                                                                                                                                    |
| EF                 | emission factor                                                                                                                                                                                              |
| ERT                | expert review team                                                                                                                                                                                           |
| EU                 | European Union                                                                                                                                                                                               |
| EU ETS             | European Union emissions trading scheme                                                                                                                                                                      |
| GHG                | greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF |
| HFCs               | hydrofluorocarbons                                                                                                                                                                                           |
| IE                 | included elsewhere                                                                                                                                                                                           |
| IEA                | International Energy Agency                                                                                                                                                                                  |
| IEF                | implied emission factor                                                                                                                                                                                      |
| IPCC               | Intergovernmental Panel on Climate Change                                                                                                                                                                    |
| ITL                | international transaction log                                                                                                                                                                                |
| KP-LULUCF          | Land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol                                                                     |
| kg                 | kilogram (1 kg = 1,000 grams)                                                                                                                                                                                |
| LULUCF             | land use, land-use change and forestry                                                                                                                                                                       |
| LUM                | land-use matrix                                                                                                                                                                                              |
| m <sup>3</sup>     | cubic metre                                                                                                                                                                                                  |
| MCF                | methane conversion factor                                                                                                                                                                                    |
| Mg                 | megagram (1 Mg = 1 tonne)                                                                                                                                                                                    |
| Mt                 | million tonnes                                                                                                                                                                                               |
| Mtoe               | million tonnes of oil equivalent                                                                                                                                                                             |
| N                  | nitrogen                                                                                                                                                                                                     |
| NA                 | not applicable                                                                                                                                                                                               |
| N <sub>2</sub> O   | nitrous oxide                                                                                                                                                                                                |
| NE                 | not estimated                                                                                                                                                                                                |
| NIR                | national inventory report                                                                                                                                                                                    |
| NMVOCs             | non-methane volatile organic compounds                                                                                                                                                                       |
| NO                 | not occurring                                                                                                                                                                                                |
| NO <sub>x</sub>    | nitrogen oxides                                                                                                                                                                                              |
| PFCs               | perfluorocarbons                                                                                                                                                                                             |
| QA/QC              | quality assurance/quality control                                                                                                                                                                            |
| SEF                | standard electronic format                                                                                                                                                                                   |
| SF <sub>6</sub>    | sulphur hexafluoride                                                                                                                                                                                         |
| SIAR               | standard independent assessment report                                                                                                                                                                       |
| SO <sub>2</sub>    | sulphur dioxide                                                                                                                                                                                              |
| TJ                 | terajoule (1 TJ = 10 <sup>12</sup> joule)                                                                                                                                                                    |
| UNFCCC             | United Nations Framework Convention on Climate Change                                                                                                                                                        |